# School Shop

vol. III no. 4
December, 1943

**Improving Teaching of Advanced Classes**
by Robert E. Smith

**The School Shop Goes Extracurricular**
by Earl D. Phillips

**Causes and Cures of Welding Troubles**
by C. H. Jennings

**Solving the Duet Problem**
by Lewis H. Sterner

Shop Tested Projects ● News from Industry ● from Washington ● Strictly Personal ● News

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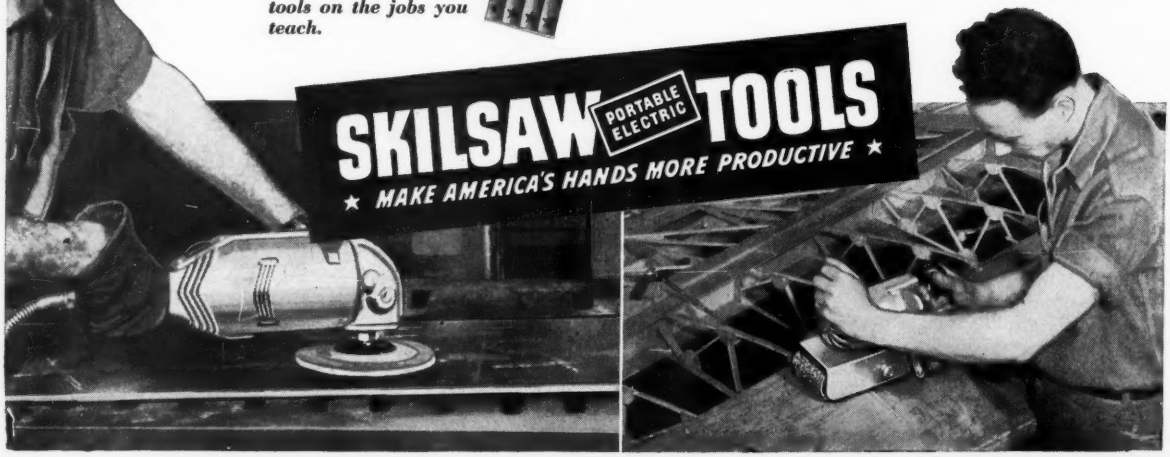

## *The Cover . . . . .*

**The youngsters on the cover of this month's magazine are junior-high students who have participated in the model-yacht racing contests sponsored by the Detroit, Michigan, public schools for a number of years. Their interest in this valuable type of shop activity is obvious from the expressions on their faces. The yacht pictured is described in full detail by Earl D. Phillips, Detroit teacher, in an article on pages 5-9 of this issue.**


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# School Shop

**FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS**


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**School Shop is published monthly, September through June, at Ann Arbor, Michigan. Manuscripts are paid for at regular space rates and should be addressed to the Editor, School Shop, Box 100, Ann Arbor, Michigan. Subscription rates to libraries and institutions, $2.00 a year; Foreign and Canadian, $3.00 a year. 25 cents a copy. Printed in the U. S. A.**


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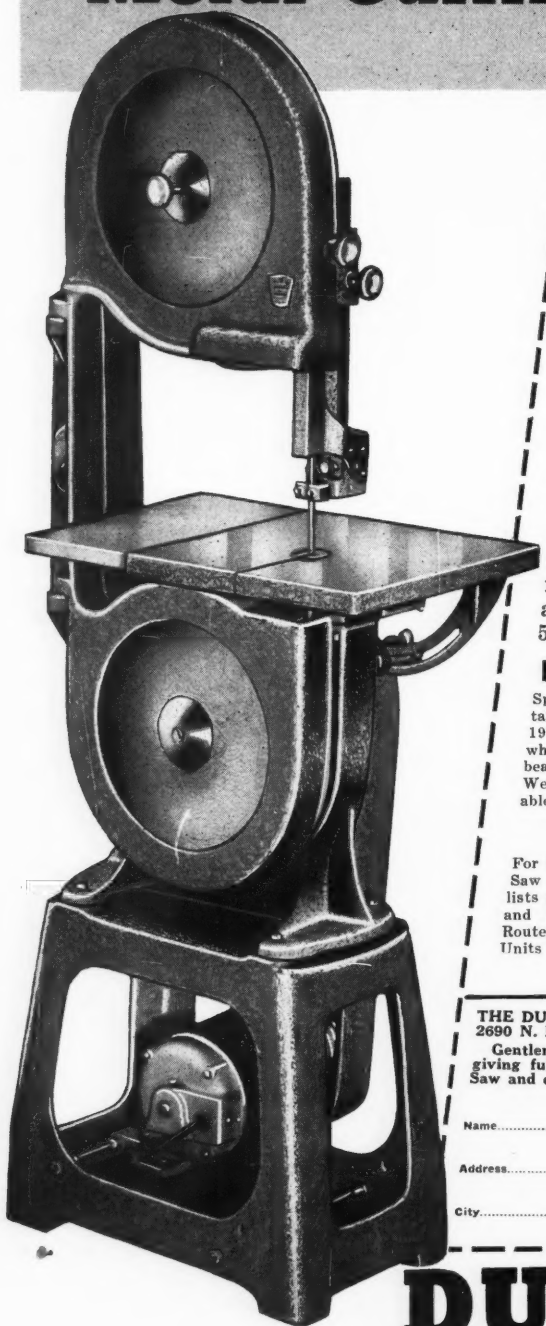

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# Improving Teaching of Advanced Classes

BY *Robert E. Smith*

**This article, the last in a series of three prepared by Dr. Smith for SCHOOL SHOP, describes technics useful in advanced classes in industrial arts for achieving the educational ends outlined in the first article in the series. Instructors will find the material in this article useful in measuring achievement in their own teaching. Specific methods are pointed out for gaining the optimal instructional possibilities in shopwork. Robert E. Smith is a member of the faculty of Ohio State University.**

WHEN discussing in previous articles the teaching of classes composed of beginners, little emphasis was given to development of such characteristics as initiative, resourcefulness, selfreliance, ability to discriminate, and capacity for selfdirection, because it was felt there was a danger in requiring students to initiate before they had acquired a background of skills and information. As students advance, these qualities should be developed by providing occasions in which they will be required to make choices and decisions and to determine courses of action.

Attention then should increasingly be given to development of knowledge pertaining to the materials commonly used in industry, particularly their characteristics and uses; to problems of production; to problems of labor and management, working conditions, hours and wages, demand for workers, numbers employed, hazards of occupation, channels of entry, intellectual and physical requirements, educational requirements, both general and technical, and where and how specialized training can be obtained.

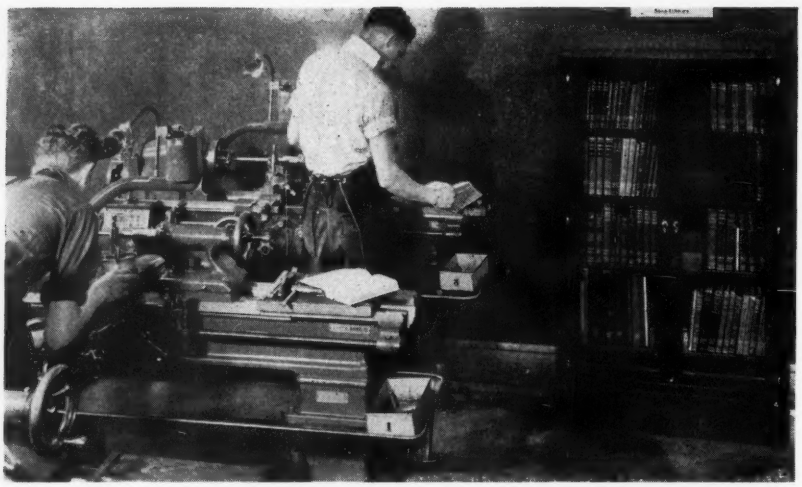
Advanced classes are, generally, comprised of (1) those who have tentatively decided on a college career; (2) those who early in the work decide on the career of a mechanic; (3) those who have tentatively decided on a career other than that of a mechanic; (4) those who are undecided on a career; and (5) those incapable of making a decision. In view of this diversity, it is necessary to organize the class work on the basis of common factors. Thus, the instructor, by taking into consideration that students are motivated by the larger personal and social purposes of preparing themselves to be intelligent selectors and users of the products of industry, will find that these students with varied interests will learn to have much in common. Fortunately, motivation is easier to achieve in industrial arts than in most other subjects and the instructor will be able to invent a number of means through the work to bring the interests of these students together.

One means of motivating students is to permit them to elect, under supervision, problems or projects of interest to them and for which they have a use or feel a need. Some instructors start advanced classes with an assigned project, subsequent projects being elected from a teacher selected group of projects, or they allow students to make a free choice. Information topics usually are assigned or elected from a prepared list. Other instructors permit their advanced students to elect, under supervision, the problems or projects on which they start the work of the semester, allowing supervised choice when the student shows evidence that he has exercised good judgment and taste under varying conditions and that he is capable of selfdirection. Still others permit free election of projects or activities from the start with little, if any, supervision, regardless of maturity or experience.

With respect to the amount of time that should be given a student to make a selection, that depends on whether the student is making an honest effort. Judging from inquiries made of the writer, this matter of indecision on the part of the students is a problem seriously disturbing many school administrators who frankly say they do not approve of a system in which students may deliberate for days or weeks before starting work which, by liberal interpretation, might be construed as constructive. Many administrators frankly say they are disgusted with the amount of outright loafing found in the area of industrial arts in their schools. It is the opinion of the writer that where idleness is found in industrial arts laboratories it is due principally to faulty planning or lack of planning on the part of the teachers concerned. Another probable cause of loafing, however, is failure of teachers to recognize that some students are incapable of making unaided decisions at their stage of intellectual development.

Any of the three methods of selection here cited may be used when starting an advanced class. The writer prefers and recommends the second. If an instructor knows that he will have the same group of students for a second semester of work he can announce that he will expect each student returning to come to the first class period with a definite idea of a problem or a project to be undertaken immediately. Better still the in-

Below is illustrated an application in a foundry class of one of the principles enunciated by the author: attention should increasingly be given to development of knowledge pertaining to materials commonly used in industry, particularly their uses and characteristics. Note the student consulting the chart giving the melting point of metals.



The need for demonstrations can be circumvented by having the student secure his own information. An up-to-date shop library is essential for this purpose.

structor can encourage each student to come with a sketch, a working drawing, or an outline of the problem he or she intends to undertake. Either of these procedures will do much to decrease delay and confusion in getting the work of the semester started promptly. In schools that have a separate drawing department, students should be permitted and encouraged to design and make working drawings of projects they desire to construct in the shop. Not only would this enable students to come to the shop prepared to go to work but it would vitalize drawing and make it meaningful to students in a degree seldom achieved as it is now taught in many schools.

After a student has selected a problem he should be required to make a satisfactory sketch or drawing, a bill of the materials required, and a plan of procedure just as was suggested in a previous article for beginning students.

In the first article in this series one of the suggested objectives was that the school should aid students to become progressively more and more selfreliant, resourceful, and capable of selfdirection. To this end the teacher should provide students taking advanced work both opportunities and occasions to assume responsibilities and to exercise selfdirection compatible with their respective abilities.

Students taking advanced work will require fewer demonstrations of processes, and most of those needed will probably be of the individual type. In many instances the need for a demonstration may be circumvented by providing means whereby a student can secure the information necessary to perform the operation confronting him. To this end the area of industrial arts should be provided with an adequate library of well-illustrated texts and reference materials. Selfinstruction, when judiciously administered, should contribute much toward the development of selfreliance.

At the advanced stage greater emphasis, as has been pointed out, should be given to the acquisition of pertinent information pertaining to materials, industrial products and processes, the problems and relationships of labor and management, knowledge of the more common occupations, occupational requirements, preparation, hazards, means of entry, opportunities for advancement, social regulation of industry, and labor legislation. To accomplish this end readings should be assigned, student reports, both oral and written, should be provided, student discussion of problems of social import should be encouraged, and opportunity for free expression of ideas afforded. To vitalize such information, extensive use should be made of references, charts, statistics, slides, and films. Showing of slides and films should be preceded by an explanation of purpose and content and followed with a class discussion. When this is not done students frequently fail to observe significant features, facts, and implications. While it has been suggested that greater emphasis should be given to the informational aspect of industrial arts in advanced classes it is not intended that opportunity for work in the laboratory should be greatly curtailed, if at all. Nor should this be necessary, because as students advance in the work they should be increasing in maturity, be capable of assuming greater responsibilities for their own education and of making discriminative decisions. One result of a weighing of values might be decision to devote a portion of available study periods to preparation in industrial arts. Furthermore, in beginning classes a considerable portion of the class period frequently is devoted to demonstration and other forms of instruction not essential in advanced work. Time thus saved can be given to class discussions and student reports.

A well-organized and democratically administered system of student personnel will provide many opportunities for students to exercise the prerogatives and responsibilities of both leadership and followership. Placing students in positions requiring leadership has often been the means of showing them the need for cooperative effort in a degree they had not previously realized, and in many instances has brought about a change of attitude and behavior that no amount of talking had effected.

Are the purposes for which the school is organized being achieved? Only tests can satisfactorily and convincingly provide the answer. True, students do not like the idea of tests; but is it the tests they don't like or is it the use made of test results? There is not much doubt that it is the latter. Students are probably as much interested in developing to a status of social acceptability and approbation as are their teachers, their parents, or any member of the community. Then why not use tests and test results as teaching devices instead of instruments of torture? Why not encourage students to employ the technic of selfevaluation, and not only in evaluation of mastery of subject matter but in matters of social acceptability and other aspects of personality development. Students have shown themselves capable of discriminative selfevaluation, the educational possibilities of the procedure have been recognized; then why not make more use of it in our teaching? It is claimed that as a result of experiences in the industrial arts laboratory students will have acquired knowledges and technics which will enable them intelligently to discriminate among values. As taught there is reason to question the validity of the claim, because of the limited opportunities provided students to evaluate themselves and their work under conditions comparable to normal life activities. Provide the students increasingly with opportunities to engage in normal work-a-day activities and watch them develop.

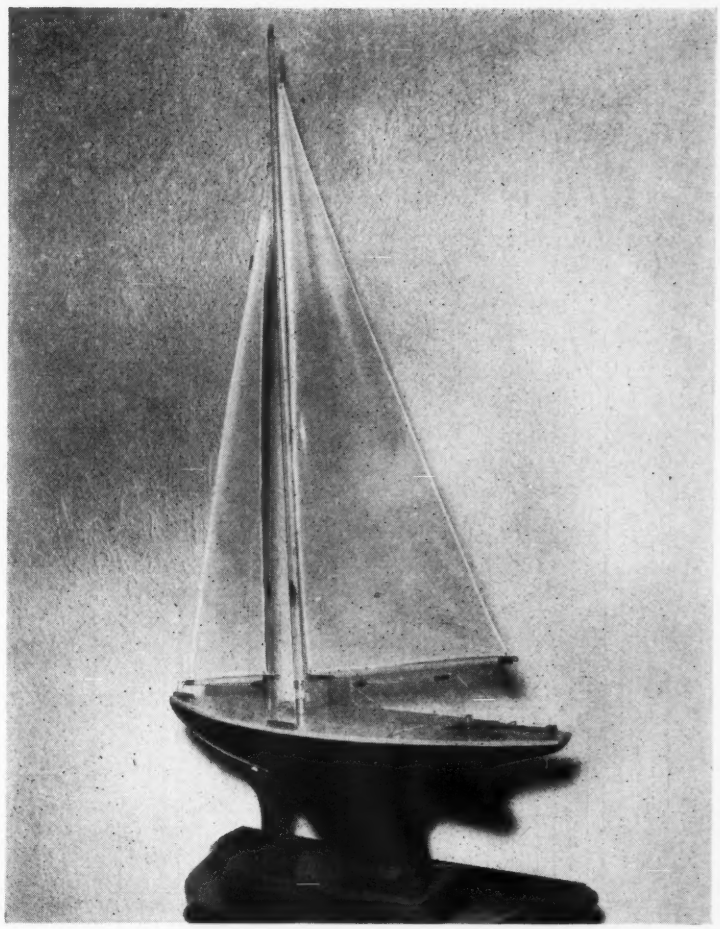
What industry and the armed services

*(Continued on page 21)*

# The School Shop Goes Extracurricular

## BY *E. D. Phillips*

**Here are detailed explanations, plans, and photographs for model yacht building. The author, after pointing to the educational opportunities to be drawn from this project, presents a concise description of the steps in construction. The accompanying plans are complete in every respect. Earl D. Phillips is on the faculty of Tappan Intermediate School, Detroit, Michigan.**



MODEL yacht building is an excellent medium for developing exacting skills, pride, group participation, constructive rivalry, and exhilarating recreational interest. This writer highly recommends it as a means for bringing the home, the community, the school system, and school shop work in close cooperation through the extracurricular activity which model yacht building inevitably introduces.

Whether the builder of a model yacht enters his finished product in a contest for craftsmanship or in a race to have it vie in speed and maneuverability with other models, the resulting incentives and pride serve to deepen his interests in shop projects.

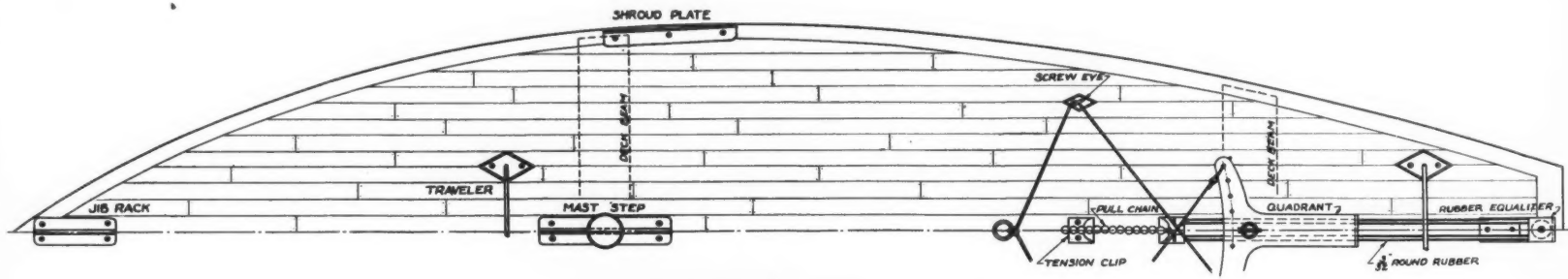
Operations in wood, metal, and fabrics introduce the builder to many pieces of equipment, tools, materials, and operations. The use of salvage materials encourages resourcefulness, and the enlistment of cooperation of parents in his project focuses interest of the home on school shop work. Participation in the sport of model yacht racing in accordance with established rules provides an outlet for play of high educational value and introduces to the student some basic facts of yachting and yachtsmanship. The finished product proudly displayed on the mantel at home or engaged in friendly competition gives the shop class worker a real sense of achievement.

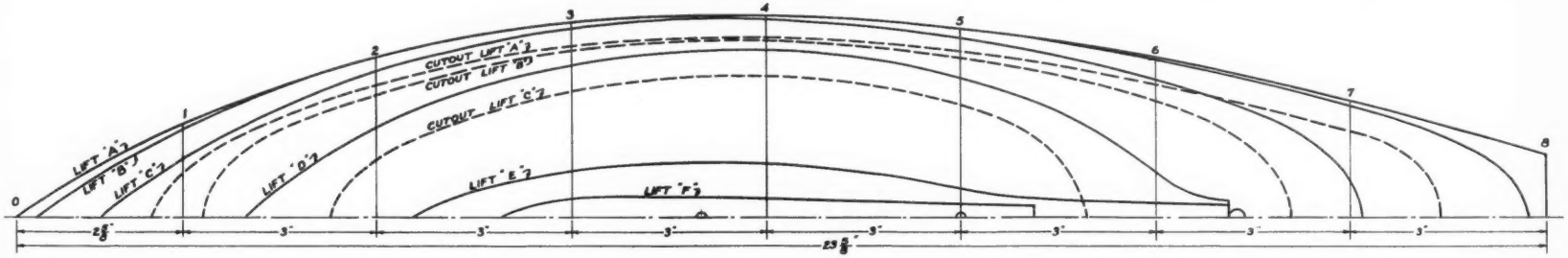
The Detroit Public Schools value model yacht building so much that since 1927 they have organized on a city-wide basis for craftsmanship and racing competition. Last June the schools there observed their fifteenth annual regatta and its eighth annual craftsmanship contest. The activity has grown and spread to nearly all the intermediate schools of the city and is rapidly taking hold in the elementary division. Beginning as individual shop projects, model yacht building has become a highly organized extracurricular group interest. And the yachts produced in the shop have developed from fin keel, cumbersome hull, and grotesque sails to built-up keels, streamlined hulls, and scientifically designed fittings and sails.

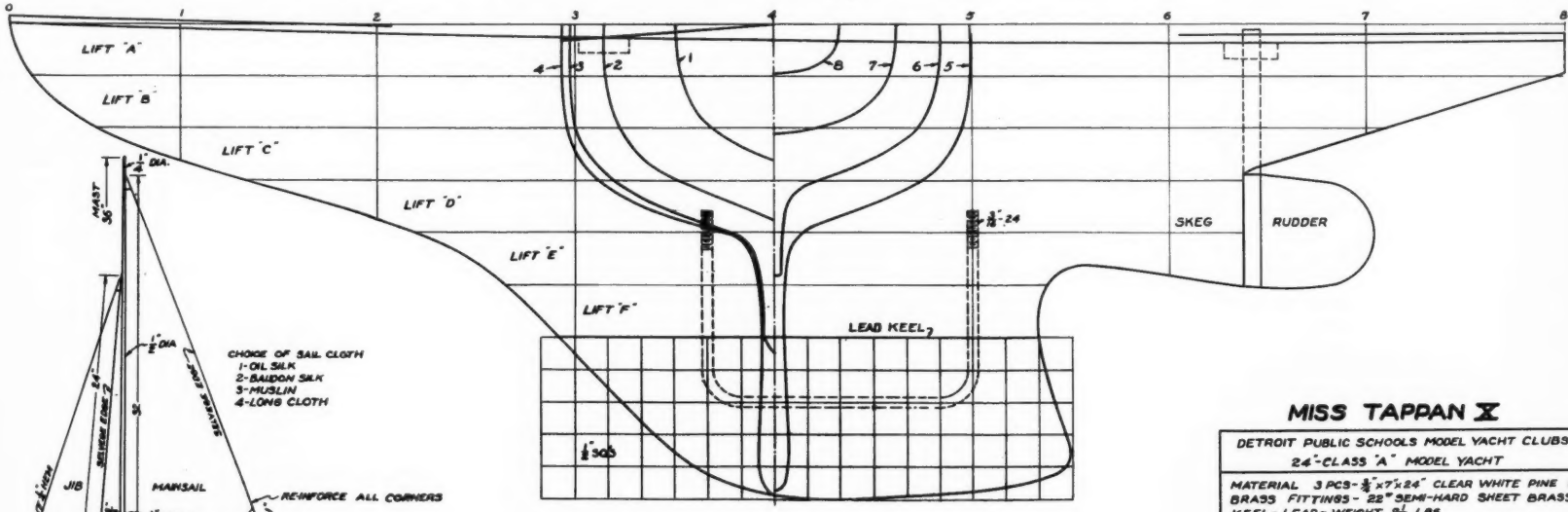
Right: The use of a set of well planned templets simplifies the laying out of the "lifts."

Of the three restricted classes of boats, the 24″ Class A, the 30″ Class B, and the 36″ Class C, being built in the Detroit Public Schools, the most popular is the 24″ Class A illustrated on this page. Into this model have been incorporated all the features of the larger models. It was designed to meet the needs of the average boy in the average school shop and not to meet the specifications of a marine engineer.

The cost of its construction was an important item. The popularity of a model yacht club depends on the economic range of the students it can draw

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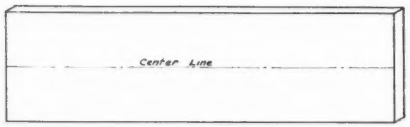
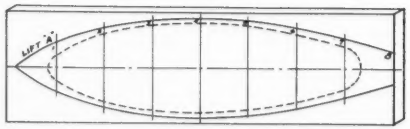
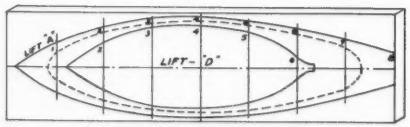
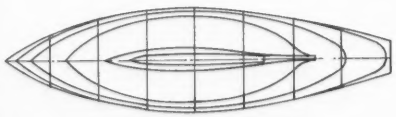
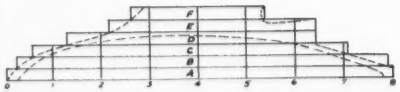
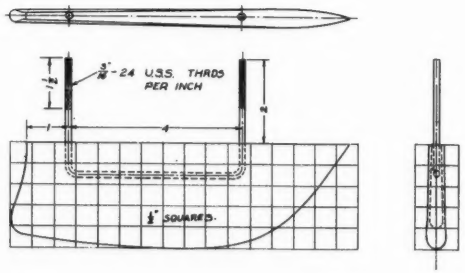
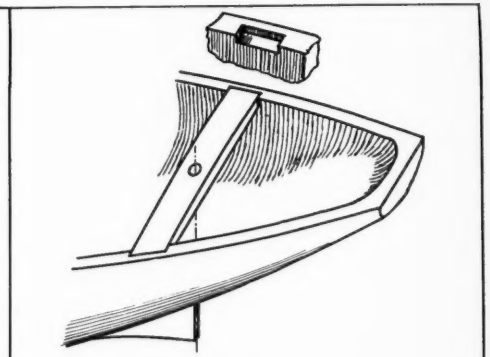


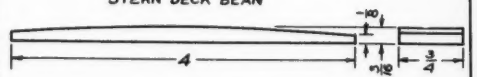



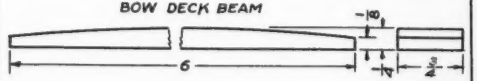


STERN DECK BEAN




BOW DECK BEAM

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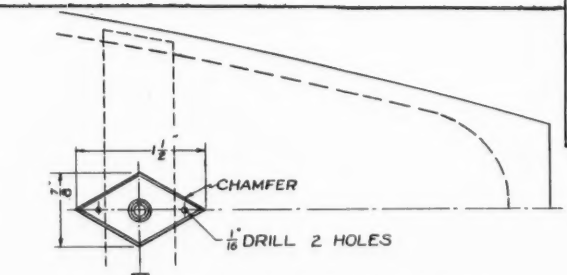
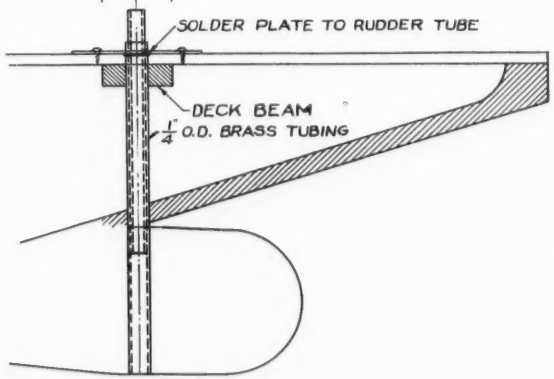
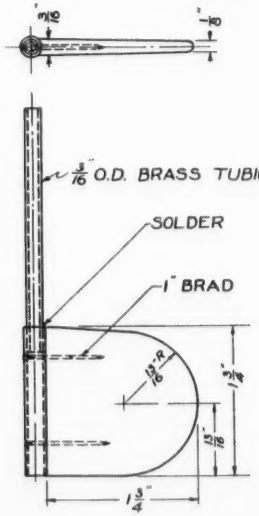
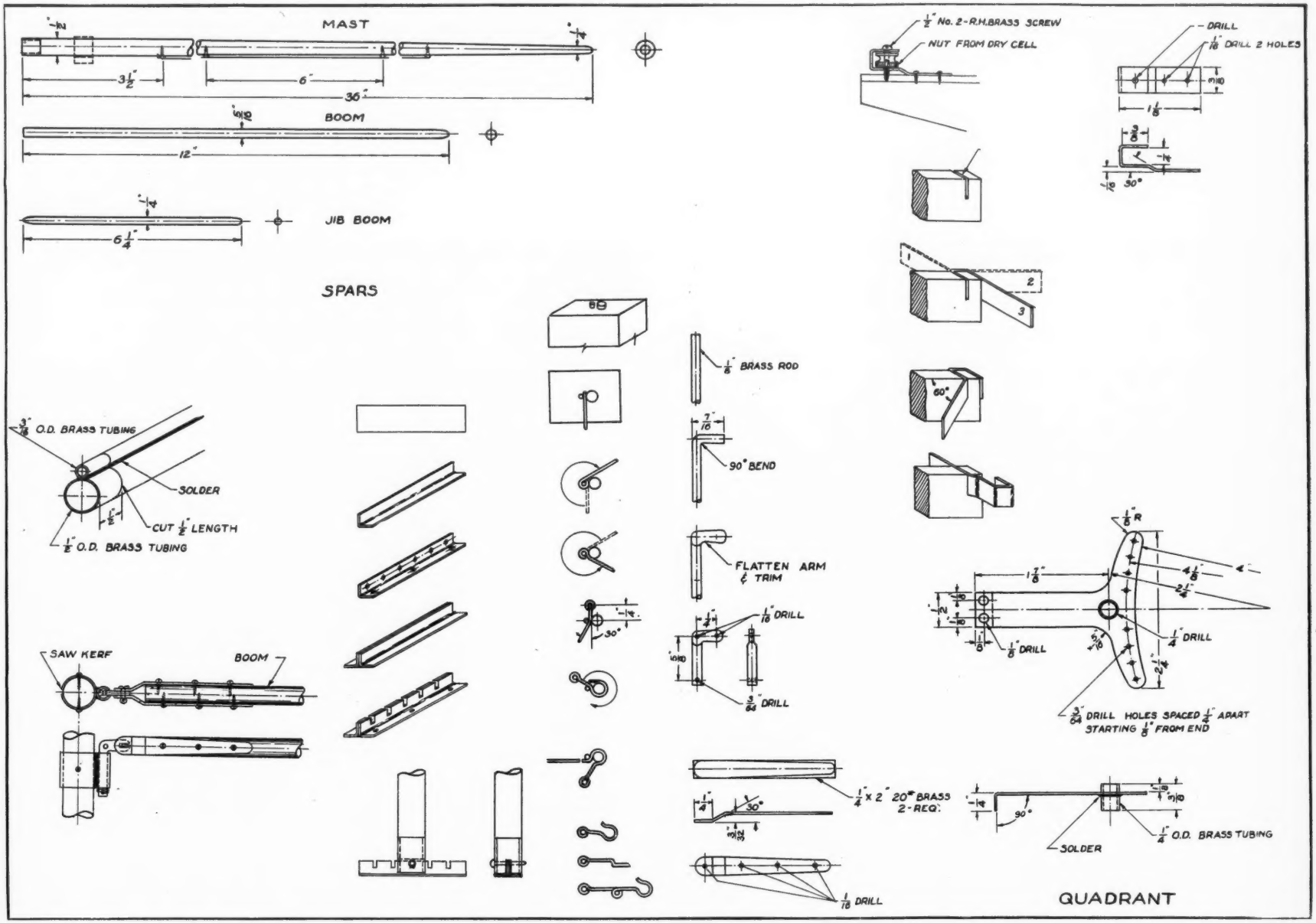



RUDDER DETAIL


MAST
3½"
6"
36"
BOOM
12"
JIB BOOM
6¼"
SPARS
⅜" O.D. BRASS TUBING
SOLDER
CUT ½" LENGTH
½" O.D. BRASS TUBING
SAW KERF
BOOM
⅛" BRASS ROD
7/16"
90° BEND
FLATTEN ARM & TRIM
1/16" DRILL
3/64" DRILL
30°
¼" x 2" 20" BRASS 2-REQ.
1/16" DRILL
½" No. 2-R.H. BRASS SCREW
NUT FROM DRY CELL
DRILL
1/16" DRILL 2 HOLES
1⅛"
30°
60°
⅛" R
1⅞"
4⅛"
2¼"
4"
⅛" DRILL
¼" DRILL
3/64" DRILL HOLES SPACED ¼" APART
STARTING ⅛" FROM END
90°
SOLDER
¼" O.D. BRASS TUBING
QUADRANT

SCHOOL SHOP

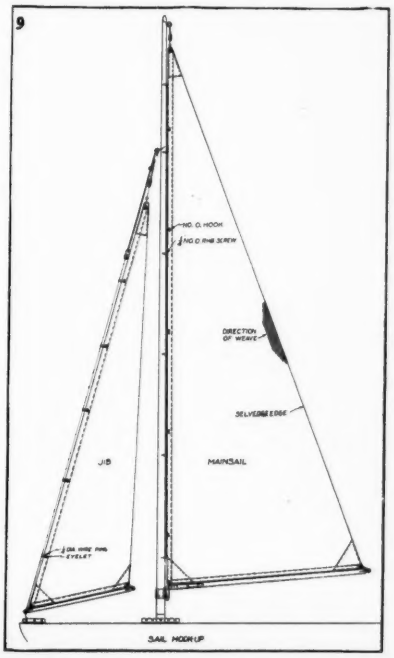
on. To reduce the cost of construction, the bread-and-butter or horizontal lift plan was adopted. This is the most popular, quickest to build, and considered by many the cheapest and simplest method of construction.

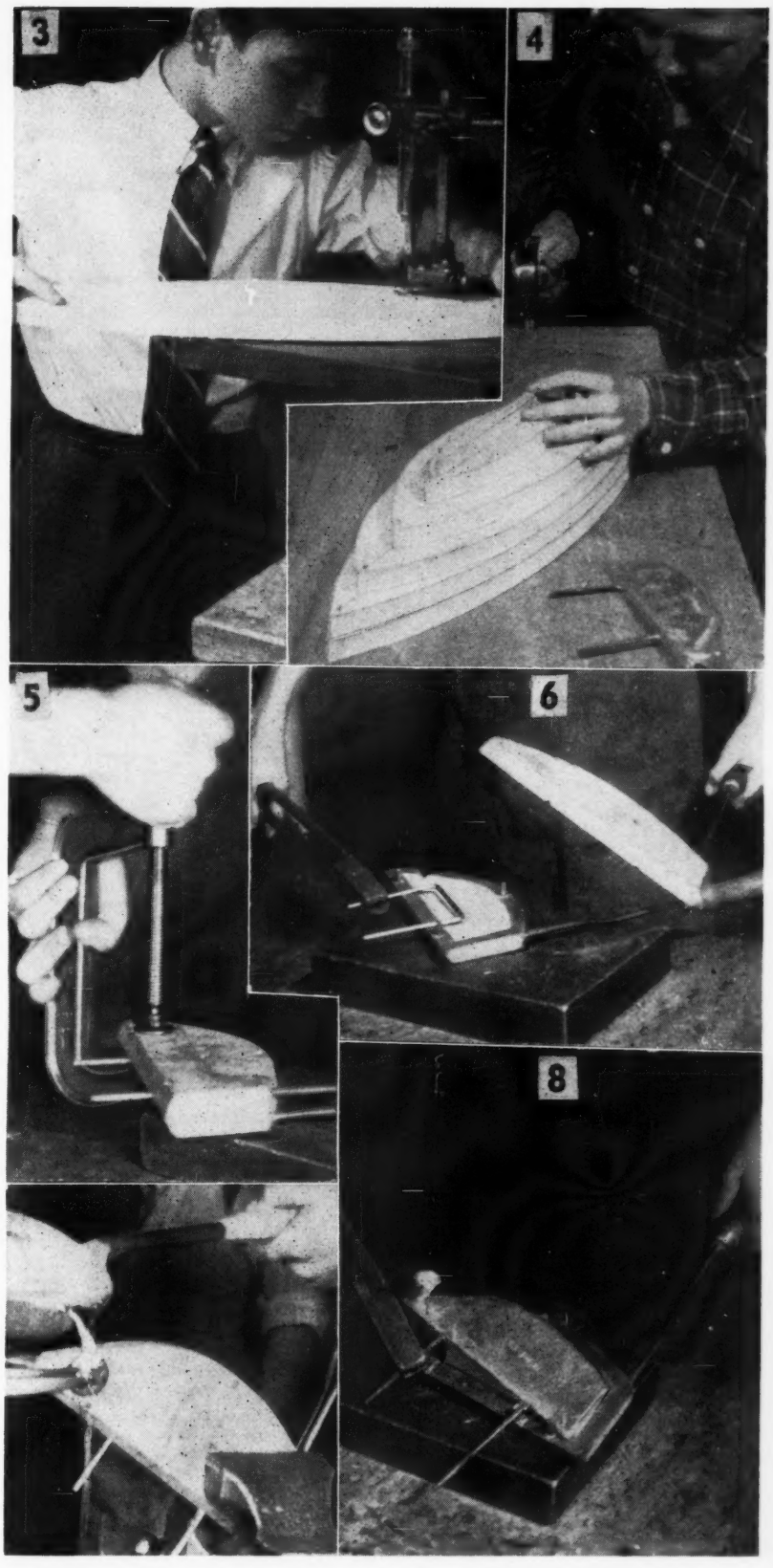
In this method, each water-line on the drawing or templet is transferred to the lift (See No. 2) and cut to shape (No. 3). Out of the centers of the first three lifts *A, B,* and *C,* are cut the last three lifts, *D, E,* and *F* (See plan on page 6). In this way much of the inside of the hull is removed before the gluing up of the hull begins. Just before gluing, the lifts are held in place by the use of brads driven through the center lines of the lifts (No. 4), thus holding the lifts from shifting while they are being clamped. By removing the corners of the lifts after gluing, the hull is roughly formed into shape.

In the more progressive schools, the cooperation of other shops is enlisted in the casting of the keels as shown in Nos. 5, 6, 7, and 8. By using metal moulds for the casting of keels, the time element in model yacht building is reduced.

The steering mechanism used is known as a Braine gear. It consists of a quadrant (see page 8) on a rudder-head kept central by means of a rubber spring which can be adjusted.

The sails are patterned after the Marconi rig (see No. 9). A set of paper sail patterns containing all of the information necessary for their making is given to each boy who is very likely to call upon his mother to assist in making the sails. *(Continued on page 21)*




No. 3 (above). A power jig-saw plays an important role in cutting out the "lifts." No. 4. Brads keep the "lifts" properly centered while being glued and clamped. No. 5. The "U" bolt is cast in the keel. No. 6. The "U" bolt is clamped into position. No. 7. Pouring the keel. No. 8. Removing the keel from the mould.

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# Causes and Cures of Welding Troubles

BY *C. H. Jennings*

**This graphic presentation of welding troubles and how they may be overcome will be of particular value to teachers of VTWPW courses in arc welding and to general shop teachers who use welding occasionally, sometimes with poor results. The author is a welding engineer in the Research Laboratory, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pennsylvania.**

THERE are many fabricating difficulties encountered in the arc welding of any structure. Some of these difficulties seriously affect the strength and serviceability of the ultimate structure while others are less important and only influence the cost or appearance.

The correction of these troubles is generally not difficult providing the welding operator or teacher has a knowledge of the conditions causing them. In order to assist in detecting and correcting these undesirable factors, fourteen of the more common troubles are illustrated by photographs and discussed from the standpoint of causes and methods of correction.

Courtesy Hobart Bros. Co.

Students in a welding school bend-testing welds they have made for their "final exam."

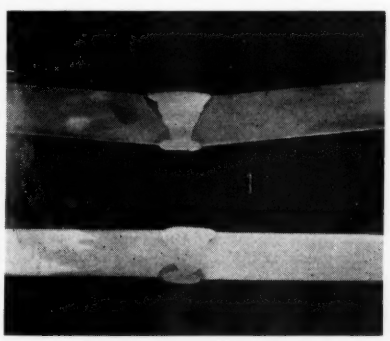


Figure 1—(top) Angular distortion obtained with single vee butt joint not properly prepared or clamped. (bottom) Single vee butt joint free from angular distortion, accomplished by proper clamping.

Figure 2—(left) Warped thin plate, improper tacking and welding procedure. (right) This plate free from warping, properly tacked and clamped, welded by skip and slip-back method.

**Figure 1—Distortion**

*Cause:* (1) Shrinkage of deposited metal pulls parts together and changes relative positions. (2) Nonuniform heating of parts during welding causes them to distort before welding is finished. Final welding of parts in distorted position prevents the maintenance of proper dimensions. (3) Improper welding sequence.

*Cure:* (1) Properly clamp or tack parts to resist shrinkage. (2) Preform parts sufficiently to compensate for shrinkage of welds. (3) Distribute welding to prevent excessive local heating. Preheating desirable on some heavy structures. (4) Removal of rolling or forming strains before welding is sometimes helpful. (5) Study structure and develop a definite sequence of welding.

**Figure 2—Warping (Thin Plates)**

*Cause:* (1) Shrinkage of deposited weld metal. (2) Excessive local heating at the joint. (3) Improper preparation of joint. (4) Improper clamping of parts.

*Cure:* (1) Select electrode with high welding speed and moderate penetrating qualities. (2) Weld rapidly to prevent excessive local heating of the plates adjacent to the weld. (3) Do not have excessive spaces between the parts to be welded. (4) Properly clamp parts adjacent to the joint. Use back up to cool parts rapidly. (5) Use special welding sequence; step back or skip procedure. (6) Peen joint edges slightly before welding. This elongates edges and the weld shrinkage causes them to pull back to the original shape.

**Figure 3—Welding Stresses**

*Cause:* (1) Joints too rigid. (2) Improper welding sequence. (3) Inherent in all welds, especially in heavy parts.

*Cure:* (1) Slight movement of parts during welding will reduce welding stresses. (2) Make weld in as few passes as practical. (3) Peen each deposit of weld metal. (4) Anneal finished product at 1100-1200° F. for one hour per inch of thickness. (5) Develop welding procedure that permits all parts to be free to move as long as possible.

**Figure 4—Splatter**

*Cause:* (1) Inherent property of some electrodes. (2) Excessive welding current for the type or diameter of electrode used. (3) Excessively long arc. (4) Arc blow.

*Cure:* (1) Select proper type of electrode. (2) Do not use excessive welding current. (3) Hold proper arc length. (4) Reduce arc blow. (5) Paint parts adjacent to weld with

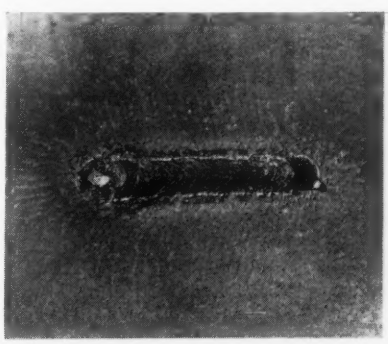


Figure 3—Lines radiating from the weld are located where the mill scale has cracked off the plate because the residual stresses produced by the weld shrinkage have exceeded the yield point of the material.

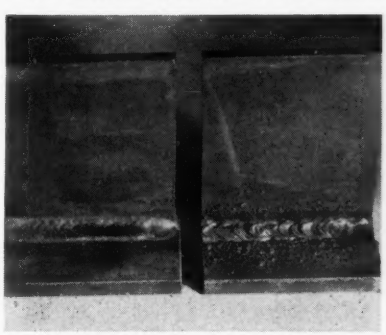


Figure 4—(left) Weld made with proper current and arc length; note absence of adhering splatter. (right) Weld made with excessive current and arc lengths; note excessive splatter and poor appearance.

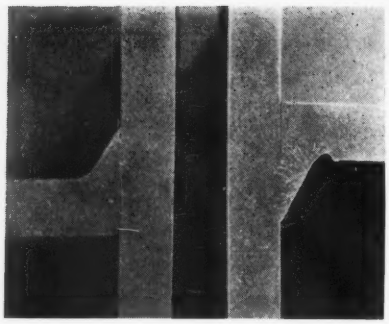


Figure 5—(right) Undercut on fillet weld. (left) Good fillet weld; complete penetration, flat face, and no undercut.

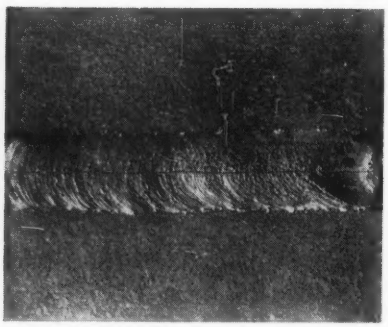


Figure 6—Cracked weld caused by rigid joint.

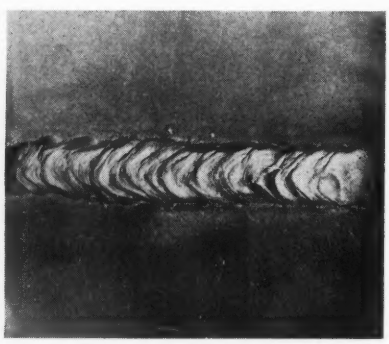


Figure 7—Weld with poor surface appearance caused by excessive welding current and improper weave.

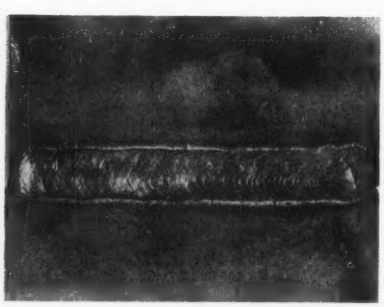


Figure 8—Weld with good surface appearance.

white wash. This prevents spalls from welding to parts and makes removal easy.

**Figure 5—Undercut**

*Cause:* (1) Excessive welding current. (2) Improper manipulation of electrodes. (3) Attempting to weld in a position for which the electrode is not designed.

*Cure:* (1) Use a moderate welding current and do not try to travel too rapidly. (2) Do not use too large an electrode. If the puddle of molten metal becomes too large, undercut may result. (3) Excessive weaving will cause undercut; consequently it should not be used. (4) A uniform weave will aid greatly in preventing undercut in butt welds. (5) If an electrode is held too near the vertical plane when making a horizontal fillet weld, undercut may be obtained on the vertical plate.

**Figure 6—Cracked Welds**

*Cause:* (1) Joint too rigid. (2) Welds too small for size of parts joined. (3) Poor welds. (4) Improper preparation of joints. (5) Improper electrode.

*Cure:* (1) Design the structure and develop a welding procedure to eliminate rigid joints. (2) Do not use too small a weld between heavy plates. Increase the size of welds. (3) Do not make welds in string beads. Make weld full size in short section 8" to 10" long. (4) Welding sequence should be such as to leave ends free to move as long as possible. (5) Insure that welds are sound and the fusion is good. (6) Preheating parts to be welded sometimes helpful. (7) Prepare joints with a uniform and proper free space. In some cases a free space is essential. In other cases a shrink or press fit may be required.

**Figures 7 and 8—Poor Surface Appearance**

*Cause:* (1) Improper current and arc voltage. (2) Overheated work. (3) Poor electrode manipulation. (4) Inherent characteristic of electrode used.

*Cure:* (1) Insure the use of the proper welding technic for the electrode used. (2) Do not use excessive welding currents. (3) Use a uniform weave or rate of travel at all times. (4) Prevent overheating of work.

**Figure 9—Poor Fusion**

*Cause:* (1) Improper diameter of electrode. (2) Improper welding current. (3) Improper preparation of joint. (4) Improper welding speed.

*Cure:* (1) When welding in narrow "vees" use an electrode small enough to reach the bottom. (2) Use sufficient welding current to deposit the metal and penetrate into the plates. Heavier plates require higher current for a given electrode than light plates. (3) Be sure the weave is wide enough to melt thoroughly the sides of a joint. (4) The deposited metal should tend to sweat onto the plates and not curl away from it.

**Figure 10—Incomplete Penetration**

*Cause:* (1) Improper preparation of joint. (2) Use of too large an electrode. (3) Insufficient welding current. (4) Too fast a welding speed.

*Cure:* (1) Be sure to allow the proper free space at the bottom of a weld. (2) Do not expect excessive penetration from an electrode. (3) Use small diameter electrodes in a narrow welding groove. (4) Use sufficient welding current to obtain proper penetration. Do not weld too rapidly.

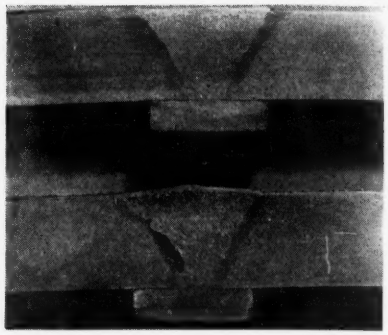


Figure 9—(top) Good butt weld; complete fusion and penetration. (bottom) Butt weld with poor fusion and slag inclusions on side, improper weaving procedure, and low welding current.

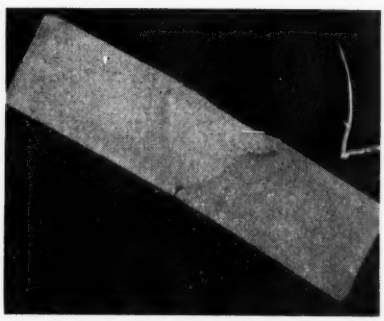


Figure 10—Incomplete penetration on vee-butt joint.

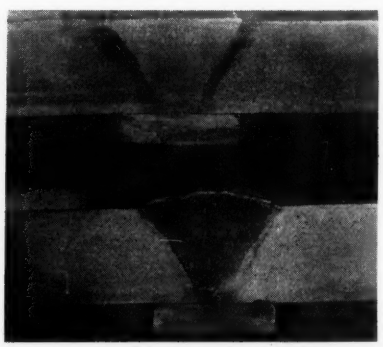


Figure 11—(top) Sound butt weld. (bottom) Porous butt weld caused by short arc and insufficient puddling.

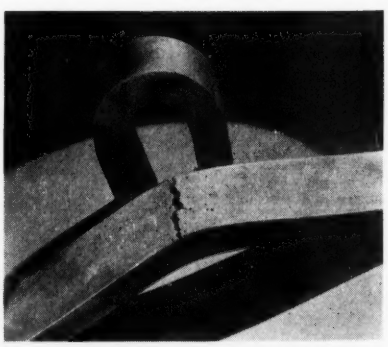


Figure 12—Ductile and brittle joints.

**Figure 11—Porous Welds**

*Cause:* (1) Inherent property of some electrodes. (2) Not sufficient puddling time to allow entrapped gas to escape. (3) Poor base metal. (4) Too short an arc length.

*Cure:* (1) Some electrodes inherently produce sounder welds than others. Be sure the proper electrodes are used. (2) Puddling keeps the weld metal molten longer and often insures sounder welds. (3) A weld made of a series of strung beads is apt to contain minute pinholes. Weaving will often eliminate this trouble. (4) Do not use excessive welding currents. (5) In some cases the base metal may be at fault. Check this for segregation and impurities. (6) Do not hold too short an arc.

**Figure 12—Brittle Joints**

*Cause:* (1) Air hardening base metal. (2) Improper preheating. (3) Unsatisfactory electrode.

*Cure:* (1) When welding on medium carbon steel or certain alloy steels the heat-affected zone may become hard as a result of rapid cooling. Preheating at 300-500° F. should be resorted to before welding. (2) Multiple layer welds will tend to anneal hard zones. (3) Annealing at 1100-1200° F. after welding will generally soften hard areas formed during welding. (4) The use of austenitic electrodes is sometimes desirable on steels which harden readily. The increased weld ductility compensates for the brittle heat-affected area in the base metal.

**Figure 13—Corrosion**

*Cause:* (1) Type of electrode used. (2) Improper weld deposit for corrosive media. (3) Metallurgical effect of welding. (4) Improper cleaning of weld.

*Cure:* (1) Bare-type electrodes produce welds that are less resistant to corrosion than the parent metal. (2) Shielded-arc-type electrodes produce welds that are more resistant to corrosion than the parent metal. (3) Do not expect more from the weld than you do from the parent metal. On stainless steels, use electrodes that are equal or better than the base metal. (4) When welding 18-8 austenitic stainless steel be sure the analysis of the steel and welding procedure is correct so that welding does not cause carbide precipitations. This condition can be corrected by annealing at 1900-2100° F. (5) Certain materials such as aluminum require careful cleaning of all slag to prevent corrosion.

**Figure 14—Irregular Weld Quality**

*Cause:* (1) Improper electrode manipulation. (2) Excessive welding current. (3) Welding in improper position for which electrode is designed. (4) Improper joint design.

*Cure:* (1) Use a uniform weave or rate of travel at all times. (2) Do not use excessive welding currents. (3) Use an electrode designed for the type of weld and the position in which the weld is to be made. (4) Prepare all joints properly.

**Figures 15 and 16—Magnetic Arc Blow**

*Cause:* (1) Magnetic fields cause the arc to blow away from the point at which it is directed. Magnetic blow is particularly noticeable with d-c at ends of joints and in corners.

*Cure:* (1) Proper location of the ground on the work. Placing the ground in the direction the arc blows from the point of welding is often helpful. (2) Separating the ground in two or more parts is helpful. (3) Weld toward the direction the arc blows. (4) Hold a short arc. (5) Change magnetic path around arc by using steel blocks. (6) Use a-c welding.

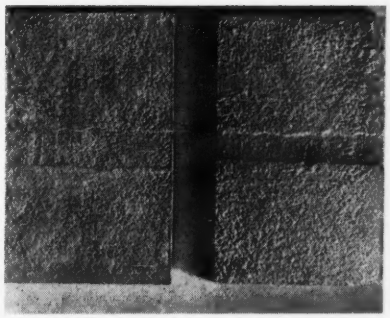


Figure 13—(left) Corrosion of welded joint ($HNO_3$). Note weld is almost comparable to parent metal. (right) Improper electrode causes poor corrosion resistance of weld ($HNO_3$).

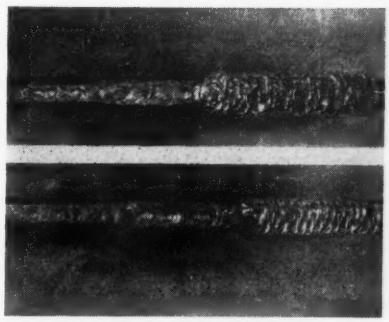


Figure 14—(top) Poor vertical weld; improper electrodes, welding technic. (bottom) Good vertical weld; proper electrode, current, and electrode manufacture.

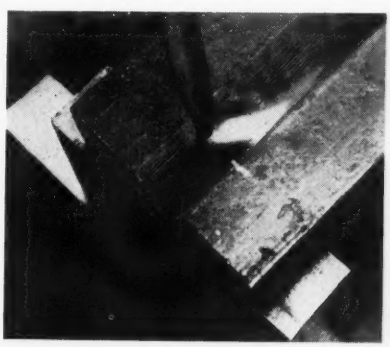


Figure 15—Arc blow at end of joint.

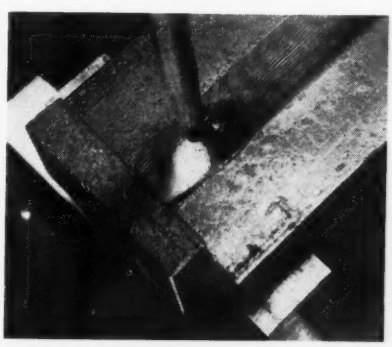


Figure 16—Arc blow controlled by use of magnetic shunt (block of steel at end of joint).

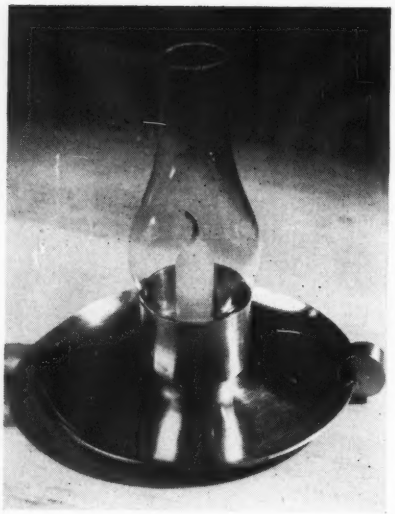
## Repairing a Quill Cork

*A bent quill can be neatly fixed*
*If you will only try this trick*
*Insert a pen point in its place*
*It makes it just like new that quick*

Most drafting teachers have more or less trouble with quill corks for ¾-ounce India ink bottles. In my classes we have found a way to overcome this difficulty with but a minimum expenditure of time and money. When the quill breaks off, all that is necessary is to take a pen point and insert it in the cork as illustrated. The pen point will pick up sufficient ink to fill the ruling pen when dipped in the ink bottle.—*F. N. Newton, Jr., Sharon, Penna., Public Schools.*

# A Pewter Cyclone Lamp

BY *Wallace W. Buffmire*



**The author has found this project of value in handcraft classes because it involves the simplest type of metal spinning, forming of metal by hand, soldering, and finishing. Student interest is high because the project shows up well, is useful around the home, and is decorative. Wallace W. Buffmire teaches at Evanston Township High School, Evanston, Illinois.**

TESTED INSTRUCTIONAL PROJECT

IF you have a wood-turning lathe in your shop and wish to try some new type of work, try metal spinning. The change from wood-turning is very inexpensive; a few spinning tools or a pointed broom stick and a rest to give leverage to the spinning tools are all that is necessary.

### Tools and Equipment

Figure 1 shows the proper shape of the broom handle, 36" long, which may be used as a turning tool if necessary. The base of the lamp shown was spun with this type of tool.

Figure 2 shows a spinning tool rest which is necessary. The dimensions given are approximate. Any scrap metal may be used to construct such a rest.

Figure 3 shows the tail stock with the follow block separated by a thrust bearing. Purchase a similar bearing with a hole a trifle larger than the diameter of the tail stock dead center. The thrust bearing may be purchased at any automobile supply store.

The cyclone lamp shown below in Figure 4 is a splendid easy job for the beginner; one which will require ample skill and one which the student will be proud to give as a gift. A pair of these lamps can be used nicely for table decorations.

### Procedure

1. Select pieces of well seasoned maple wood. Cut one piece 2" x 5½" x 5½". Draw a 5" circle and cut around it with a band saw. Fasten the block to a face plate and turn to the shape and size given in Figure 5. It might be well to use a templet to get the exact shape of the base. Sand the block smoothly.

2. Turn up a follow block, Figure 3. Drill a hole in the center of the follow block slightly larger than the diameter of the dead center on the lathe. Lubricate the hole with beeswax or tallow. Insert the thrust bearing between the follow block and the tail stock holder of the lathe.

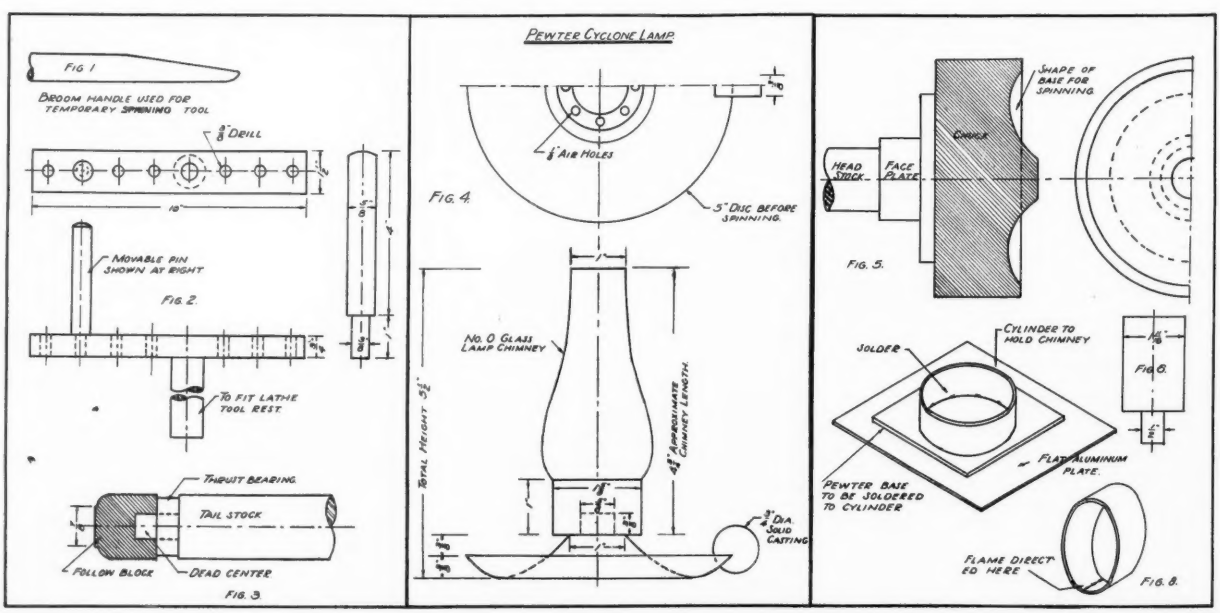
3. Select a disc of 16-gauge pewter 5½" in diameter. Place the center of the disc as nearly as possible on the center of the wooden chuck. Draw up the follow block until it holds the disc in place. Do not draw up the follow block too tightly. Start the machine. Lubricate the disc with beeswax or tallow candle touched to it.

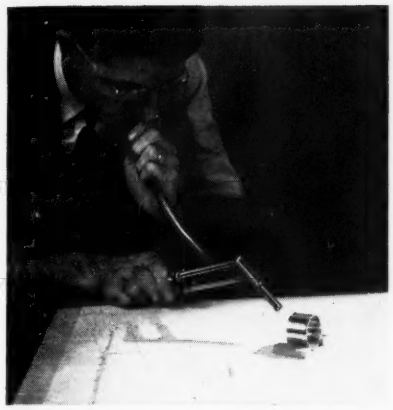
4. Set fulcrum pin a little to the right of the disc. Hold the end of the spinning tool under the right arm and to the left of the pin. Work against the chuck. Do not use too much pressure. If too much force is used the metal becomes thin and will tear, especially where it is held by the follow block.

5. After the metal has been spun over the form any excess metal should be trimmed off.

6. Remove the tool rest and while chuck is still turning clean the pewter with a fine emery paper and then 0000 steel wool.

7. Construct two wooden cylinders; one for the chimney holder form and one for the candle holder form. These forms may be a trifle larger than the





**Soldering the chimney base on the inside.**

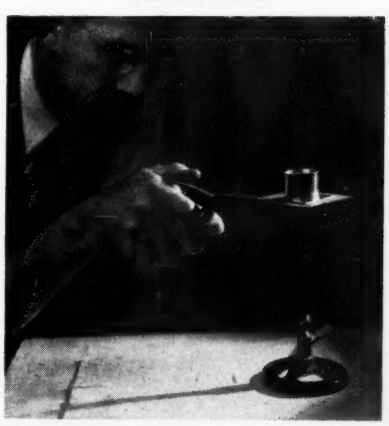
finished pewter cylinders (see Figure 6). Flatten the ends of the forms so that they may be held conveniently in the vise.

8. Cut a piece of 16-gauge pewter a little wider and longer than the height and circumference of the finished piece. Wrap the pewter firmly around the wooden cylinder. Solder the ends together from the inside, using 50-50 pewter solder. The cylinder to hold the candle is made in the same way.

9. Cut a piece of pewter for the chimney base. It may be approximately 1⅞" square. Be sure the pewter is absolutely square and flat before any soldering is done. If it is not flat, tap it lightly with a rubber covered hammer. Square up one edge of the cylinder with a fine file. Test the pieces.

10. Place flux and pewter solder on the inside of the cylinder and place the whole thing on a flat piece of aluminum. Hold the aluminum over a Bunsen burner. Care must be taken not to melt the pewter cylinder. A 70-30 solder may be used. This type of solder will melt more readily than the pewter itself. When the two pieces have been properly soldered, the melted solder will form a bright silvery line on the outside of the cylinder at the base. At first little bubbles of flux will appear, but do not mistake this for the solder. The line which will form will be brighter than the pewter and will be free of any bubbles from the flux.

**Soldering the chimney base to the bottom over a Bunsen burner.**



11. Cut away excess pewter with the tin snips. Smooth with a fine file, emery cloth, and 0000 steel wool.

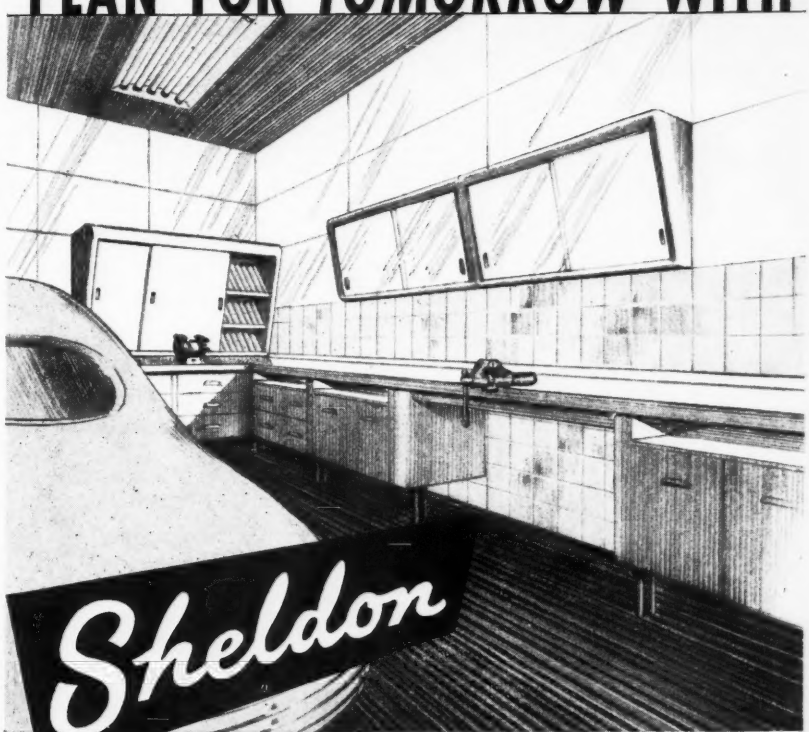
12. Solder the cylinder for the candle holder as you did for the larger cylinder, step 6.

13. Solder the candle holder cylinder to the inside of the base (see sketch).

14. The handle for the lamp is nothing more than a cast, solid piece of pewter made from scrap material. The scrap material was melted in a metal container, poured into a sand mold, and allowed to cool. Pieces were then cut off ⅜" x ¾" in diameter, finished as in step 11, and soldered to the base of the lamp.

15. After the completion of the lamp the entire job should be polished with fine steel wool, 0000, and then "rubbed up" with a soft cloth.


PLAN FOR TOMORROW WITH

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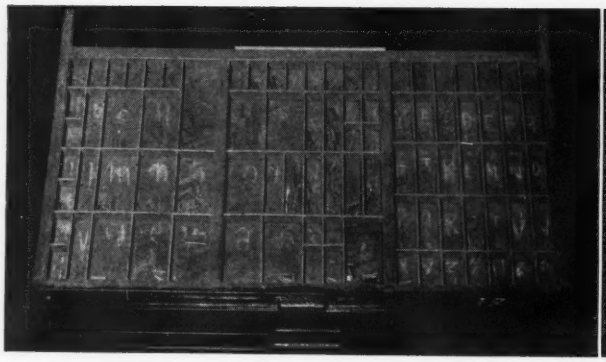
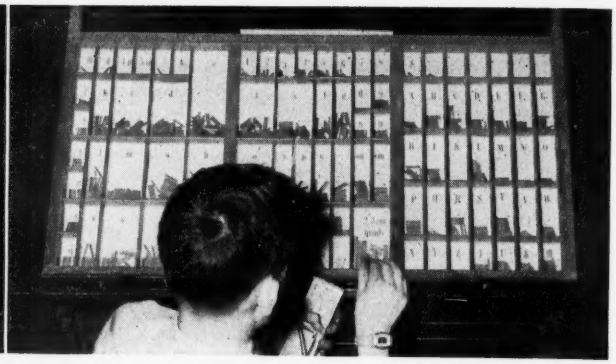


Type case BEFORE using inserts.



Type case AFTER using inserts.

# Triple-Duty Type Case

## FOR TRYOUT CLASSES

BY *David M. Teichler*

**The type-case liner described by the author not only serves to help the beginning student become familiar with the case but also is an excellent project in itself, involving as it does letterpress printing, diecutting, and scoring. David M. Teichler teaches printing at the Brooklyn High School of Automotive Trades, Brooklyn, N. Y.**

THREE problems face the teacher of printing who sees several classes of students each day, each class using in turn the same type cases.

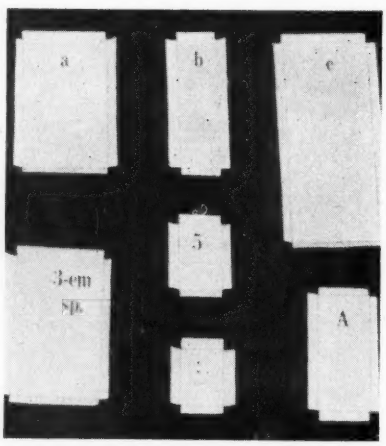
First, the tryout course is generally short and the difficulty of learning the layout of the case tends to make the student lose sight of the more pleasant phases of typesetting. A labeling device seems to be indicated here as the corrective.

Second, frequent use and abuse of type cases causes them to develop open seams, permitting type from one box to slide into adjoining boxes. Renailing is not always feasible because of the warping of the wood. Frequently discolorations caused by ink and dust give a sorry appearance to the whole case. A "facial" and closing of the small opening are needed here.

Third, student indifference regarding type losses often is reduced when he is made aware that there is a definite quantity of type in each box for which he will be held accountable. The solution, therefore, is a type-case inventory.

All three problems have been solved with the introduction of the box inserts described below. Stated simply, each box in the case is fitted with an insert as shown in the picture to the right, resulting in the rejuvenated appearance as in picture on the right above. These inserts fold so that they close any open seams, thus keeping the type in its proper boxes. They bear a large printed character indicating the type contained in the box and the corner of each insert bears the number of characters present at inventory time. Their bright fresh color (in our shop, buff) adds attractiveness to the case.

Making the inserts is in itself a worthwhile graphic arts project, combining letterpress printing with diecutting and scoring. The *modus operandi* follows.




**Inserts, showing diecutting and scoring operations.**

Standard California job cases can be divided into eight box sizes:

| | |
|---|---|
| Size of the "e" box | 1 box |
| Size of the "a" box | 14 boxes |
| Size of the "b" box | 11 boxes |
| Size of the "A" box | 21 boxes |
| Size of the figure 1 box | 24 boxes |
| Size of the period box | 2 boxes |
| Size of the colon box | 2 boxes |
| Size of the "X" box | 14 boxes |
| Total | 89 boxes |

An examination reveals that the sizes may be "ganged" in three forms:

| | |
|---|---|
| "e," period and colon boxes | equal 1 form |
| "a," "b," and "X" boxes | equal 1 form |
| "A," figure 1 boxes | equal 1 form |

Using ordinary one-point brass rule for scoring, make up each form to exact box dimensions. Then extend from each corner of the form two-pica pieces of cutting rule to cut away the corners of the stock (see picture in center of page).

After the whole form is made up, lock up in the usual manner, attaching pieces of cork or sponge rubber to the form next to the cutting rules. These will prevent stock sticking to the rules on the press.

The press should have the rollers removed before the diecutting form is placed in the bed. Make ready in the regular way, allowing for a sheet of tin to be glued on to the topsheet next to the guides so that the cutting rules will cut cleanly without burrs. The scoring rules should crease but not cut the stock. Index bristol stock in a bright but dirt-hiding color should be used.

While the inserts are still in gangs, strike in the characters using 48-point type for easy legibility. At the discretion of the instructor, figures indicating the quantity of type in each box may also be printed at the same time, or this may be done later in pen and ink.

Following the cutting apart of the inserts, students can take inventory of each box in their type case, emptying the box first and placing the printed cardboard insert within after removing the corner pieces.

The results with this project justify the effort involved. Type cases take a new lease on life, type losses are minimized, and speedier acquaintance with his case keeps the beginner's interest in typesetting from waning.

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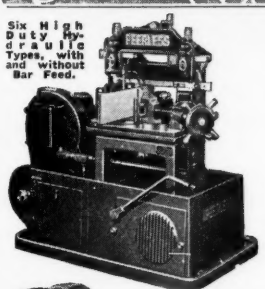


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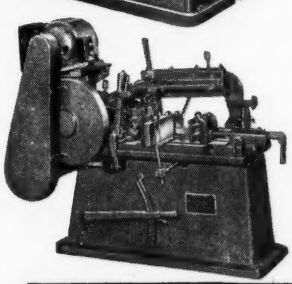

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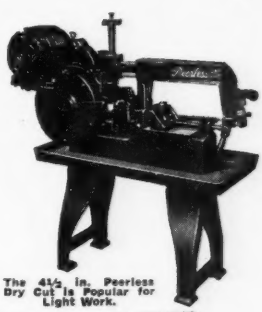

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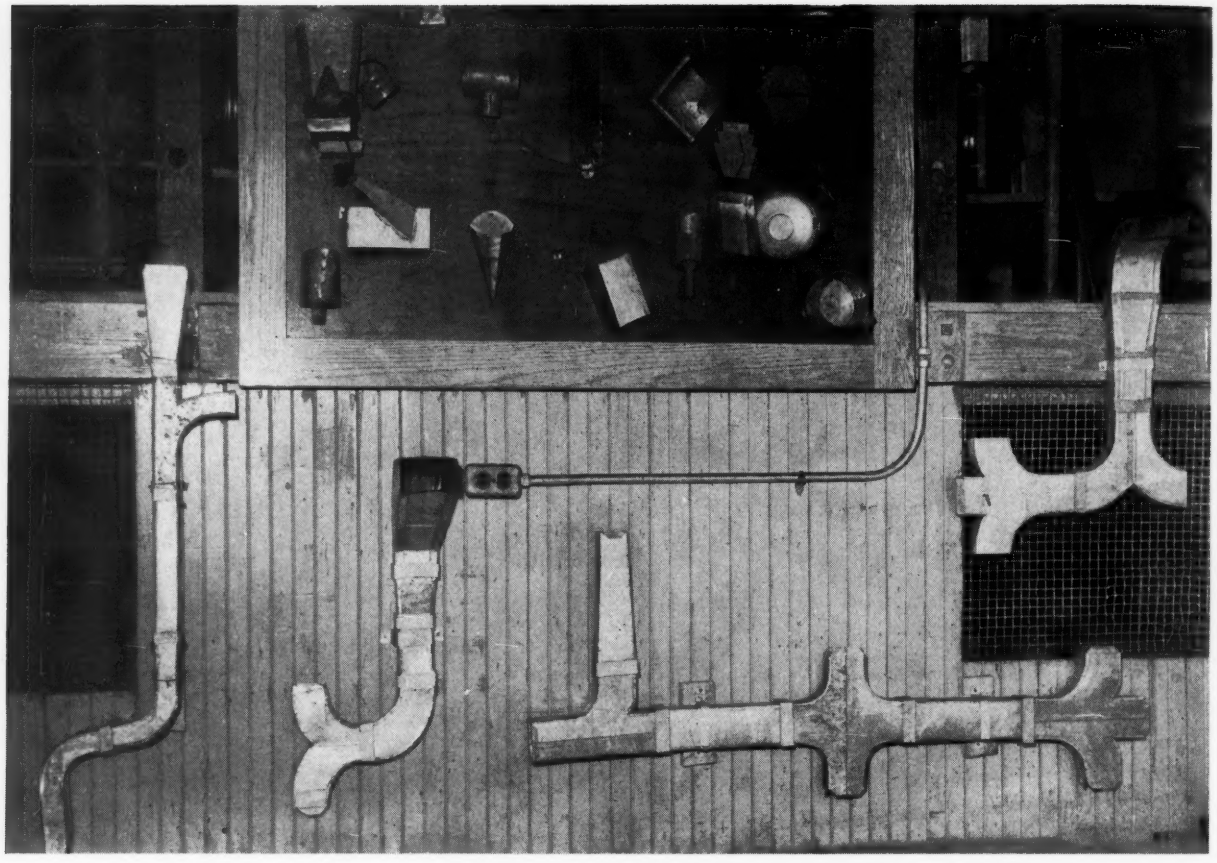


# Solving the Duct Problem

BY *Lewis H. Sterner*

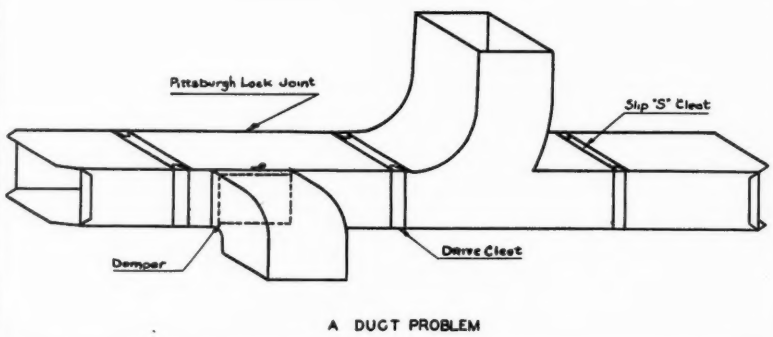
**Teachers of sheetmetal work will be interested in the method by which one of their colleagues has students lay out and execute a problem in running ducts. The method is doubly interesting because of the economical use of materials through the utilization of old tin cans as a source of metal. Mr. Sterner teaches in Kalamazoo, Michigan, Central High School.**

CONSTRUCTION and maintenance jobs are not always available to illustrate the principles of duct making and fitting at the time this subject is being discussed in the teaching program. To overcome this difficulty we use previously constructed units attached to the wall as a basis for figuring new runs. These units are made up in many shapes and sizes with various outlets and ells. Each unit is about three feet long and is mounted in such a position as to provide at least two openings between which new units of duct can be run.

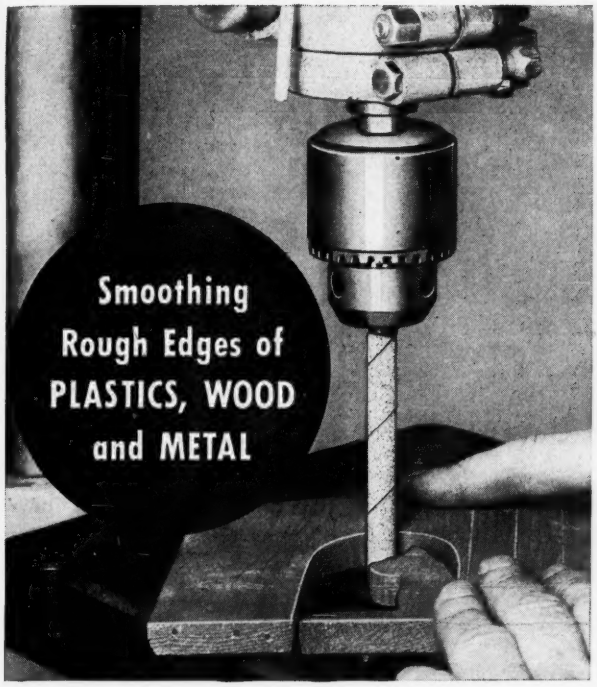
The fixed outlets establish points between which the new work is to run and are selected so that they are beyond the possible limits of full-scale pattern work. The student is assigned two points between which he is to figure his duct problem, also its shape and size. He first proceeds to measure and make a scale drawing of this new pipe connection. He also figures the position for the outlets and controls that will be included in his work. He then breaks the sketch up into workable construction units, making full sized patterns which are used for the new construction.

The picture above shows the fixed work units as attached to the wall. The drawing is a representative sketch of a new duct problem broken up for full-scale pattern work.

It is our policy to conserve essential materials by making these problems from tin cans and other salvage materials.



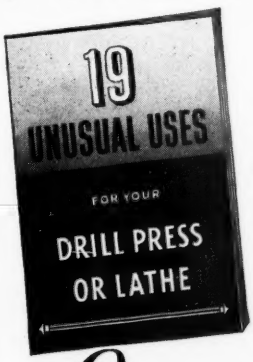

A DUCT PROBLEM




## with a SANDING STICK and JACOBS CHUCK

Most of the interior cuts made with a scroll, jig, or fret saw require sanding or smoothing to remove irregularities. Round and half-round files and sanding sticks have been used by hand for this work but the hand method is slow and tedious. Using a sanding stick in the drill press speeds up this work immeasurably and improves the quality.

Sanding sticks are easily made up in any shop. Around a section of dowel a narrow strip of abrasive paper is glued and wrapped spirally. With the drill press supplying the power both hands are free to guide the work.

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The operation outlined briefly here is one of nineteen covered in detail in our own booklet just off the press. It gives practical, helpful information on unusual and varied uses for drill presses and lathes. It contains 49 illustrations, explains how the set-ups are made, and shows the tool used. Both indutrial arts and vocational education classes can profit greatly from the ideas this booklet contains. Available to schools in any quantity at 10c per copy.

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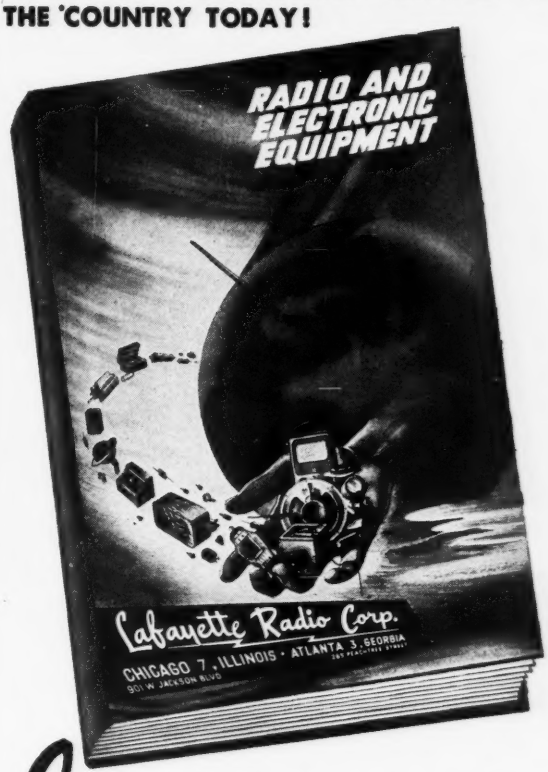


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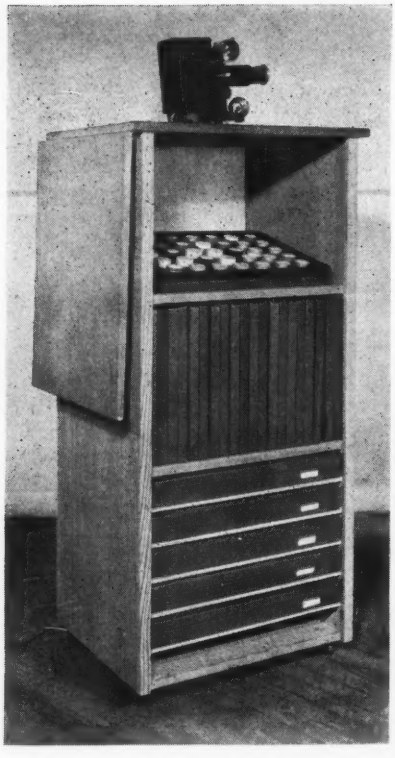
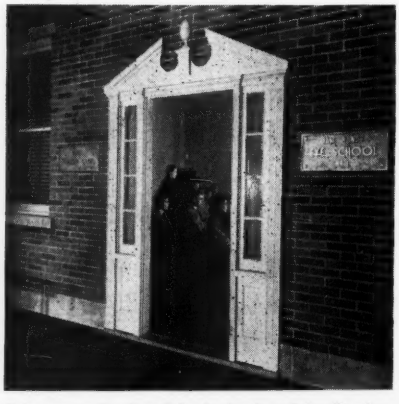
# Projector and Film Cabinet

BY *Lyne S. Metcalfe*

**This convenient stand is handy to have on hand for quick projection of instructional films in the school shop. It is readily made by students who thus can contribute to a worthwhile project for the group.**



View showing details of construction of the cabinet. Note how hinged shelf can be raised to accommodate a larger projector or turntable and speaker.



Entrance to the Eye School, developed by the Jam Handy Organization, Detroit, for the experimental showing of instructional films.

TESTED 55 INSTRUCTIONAL PROJECT

A SPECIAL slidefilm projection cabinet, built especially for, and used in, the new Jam Handy Eye School, Detroit, provides the school shop both with a simple and interesting woodworking project and when the job is done with a compact and useful cabinet and projection stand for classes using visual aids.

Pictures of the finished stand and cabinet accompany this article. Plans may be drawn as a project for class work in mechanical drawing.

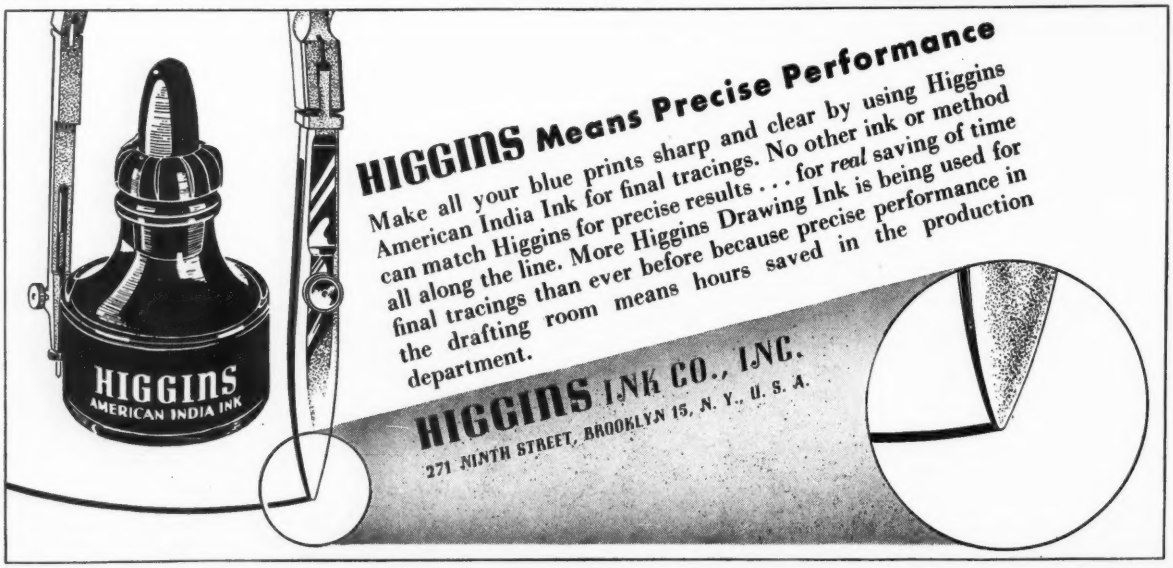
This projection cabinet provides space for convenient storage of slidefilms in Kit-sets, while the projector is placed on the top when in use and is stored in the top compartment. The height is proper for the average classroom so that the picture is projected above the heads of the students. If it is also desired to provide space for a 16mm motion-picture projector, a folding top may be added as in the photograph. In this case the bracket is mounted on hinges so that it will swing back, allowing the folding top to drop down. A door can be added if the projector and stock of slidefilms are to be kept under lock and key.

Redwood, available in the necessary width, can be used for the cabinet or plywood will do. Finish to suit the classroom. Follow standard cabinet construction in assembling parts.

**Bill of Materials**

| | | |
|---|---|---|
| Top | 1 | 13/16″x19″x24″ |
| Bottom | 1 | 13/16″x18″x22″ |
| Folding Top | 1 | 13/16″x19″x22″ |
| End | 2 | 13/16″x18″x47″ |
| Shelf | 2 | 13/16″x18″x21½″ |
| Bracket | 1 | 13/16″x14″x16″ |
| Separator | 5 | ½″x18″x21½″ |
| Back | 1 | ¼″x22″x48″ |
| Facer Strip | 2 | ½″x1¼″x47″ |

2½ Butt Hinges—1 pair
Butterfly Hinges—1 pair
Casters—4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## *Model Yacht . . . . .*

*(Continued from page 9)*

By the use of simple jigs and fixtures (see plans on page 8), the complete set of fittings can be made by the boy. Many boys prefer manufactured fittings which can be purchased from commercial firms devoted solely to model boat building supplies. The fewer and simpler the fittings on a model yacht, however, the easier the model is to handle.

The accompanying plans on pages 6, 7, and 8, are self explanatory. The technic of group ordering of stock and supplies, the use of salvage material, and the development of jigs and fixtures for the making of fittings all tend to simplify construction, reduce the time element, and bring the activity within the range of the average boy.

## *from Washington . . .*

*(Continued from page 32)*

Congress, will lean heavily on visual aids and motion pictures. Reasons are many. First, the spectacular technics of teaching developed in the armed forces through visual education methods will probably be carried over into postwar education. Many of the film strips, films, and motion pictures produced by the Army and Navy will be extremely useful for nonmilitary technical education purposes. Projectors, lanterns, screens, and other visual equipment amassed by the military will probably be assigned for veterans' education purposes. Finally, as one Navy officer said: "Our men have been taught to fight by pictures. After the war they may have scant patience for learning by any other method."

## *Improving Teaching . . .*

*(Continued from page 4)*

have found should show us clearly that regardless of how great or how small a boy's or a girl's ability may be there is a place for all and work that all can do to advantage. True, we cannot make skilled mechanics of all that come into our classes in industrial arts or vocational education or is it necessary or desirable that we do so. On the other hand we can and should adapt our work to the needs and abilities of our students so that when they leave school they will have something which they can say with confidence that they can do and can support their claims with appropriate action. Every boy and girl when they leave high school should have some salable skill, something he or she can do well.


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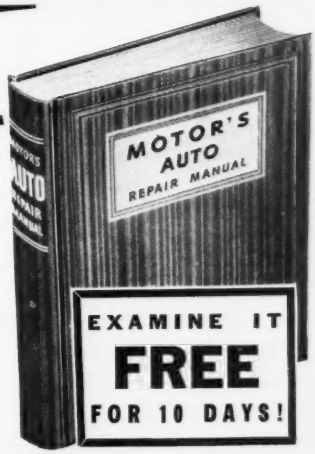


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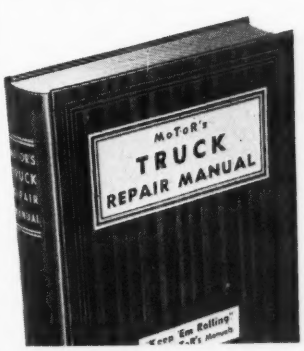


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# INSTRUCTIONAL RESOURCES

**Inquiries concerning materials described in these columns may be addressed to SCHOOL SHOP, Box 100, Ann Arbor, Mich.**

## *BOOKS:*

**Basic Radio Principles.** Suffern. New York: McGraw-Hill Book Co., 1943. Pp. x + 271. $2.25.

Designed for use in a 200-hour training course for radio repairmen and technicians, this textbook sets forth the basic facts of practical radio theory without attempting to go into technical detail involving higher mathematics and physics. Materials used in radio and their symbols, diagrams, test equipment, and principles of radio equipment operation are discussed. Circuit diagram and subject indexes.

Maurice Grayle Suffern is a captain in the U. S. Army Signal Corps.

**Fundamentals of Radio for Those Preparing for War Service.** Gorder, Hathaway, Dunlap. Chicago: American Technical Society, 1943. Pp. ix + 373. $2.00. Study Outline and Workbook.

A preinduction training course text and workbook. The text deals with the fundamental principles of radio and the way these principles are applied to radio transmitting and receiving sets. The workbook uses the "Six-Step Plan": (1) an explanatory lecture, (2) study of the lesson, (3) mental or oral test on principles and data, (4) a written test, (5) selfcheck and further review, and (6) a comprehensive examination. Glossary, reference tables, formulas, abbreviations, index.

L. O. Gorder is a consulting radio engineer. Kenneth A. Hathaway is managing director of radio parts, Manufacturers National Trade Show, Inc., and former radio technical adviser to the *Chicago Daily News*. Carl H. Dunlap is head of the electrical engineering department of the American School in Chicago.

**Beginning Mechanical Drawing.** Roberts. Peoria, Ill.: Manual Arts Press, 1943 (revised). Pp. 111. Cloth bound, $1.80. Paper, $1.12; 5 or more $.84 ea.

Book is divided into two sections: first, 39 operations, from how to sharpen a drawing pencil, use pencil erasers, to how to draw tangent arcs, construct an ellipse, use French curve. Necessary tools, related information, and procedure are given for each operation. Part two consists of problems which use these operations. Specifications and tools are given and the purpose and procedure discussed. Questions are asked about difficult or easily missed points. Drawings to illustrate.

William E. Roberts was formerly supervisor of Industrial Arts in Cleveland, Ohio.

**Slide Rule Simplified.** Harris. Chicago: American Technical Society, 1943. Pp. ix + 258. $2.50. With rule: $3.50.

A 10-inch Mannheim slide rule was selected as a basis for this text because of its wide use, simplicity, and versatility, but each chapter describing an operation with the rule contains a section on other types of slide rules. First eight chapters deal with simpler calculations while the final ones discuss sines and cosines, tangent of an angle, logs and antilogs, etc. Subjects are treated in such complete detail that it is possible to study alone. Explanation of each fundamental operation by means of logarithms for optional study is given for the benefit of those who want to know the why and wherefore of the manipulation. Practice problems, answers at back of book. Additional review problems without answers which may be used for testing. Brief discussion of negative numbers and the law of signs as review.

Charles O. Harris is Assistant Professor of Mechanics at the Illinois Institute of Technology, Chicago.

**Allied's Radio Circuit Handbook.** Chicago: Allied Radio Corp., 1943. Pp. 40, paper bound. $.10.

Fundamental principles of radio illustrated and explained in 16 basic circuits, with analyses, comparisons, and discussions. Applications of principles to various components of receivers, transmitters, and other electronic units are shown in 25 additional circuits of conventional radio and electronic units. Schematic and pictorial diagram for each unit, ranging from one-tube sets to superheterodynes.

**Junior Printing.** Lush. Peoria, Ill.: Manual Arts Press, 1943. Pp. 64. Paper bound. $.68 single copy; five or more copies, $.51 each.

A workbook for beginning printing. Diagrams, photographs, samples of high school printing. Questions and references at the end of each chapter. Tested in the Minneapolis Public Schools, where Clifford K. Lush is Supervisor of Industrial Arts.

**Scale Model Aircraft.** Woodason, edited by Buchler. 37 Aldwych, London, W.C.2, England: Useful Publications (Model Department). Pp. 110. Paper covered. $1.00.

One of the first to build model airplanes to scale, V. J. G. Woodason incorporates more than 20 years of experience in the instruction and suggestions offered in this book. Materials and tools, how to start and finish the shaping and fitting of parts, and the application, both now and in the future, of model plane building are taken up in the text. Sketches and photographs, all of Woodason models. Chapters on aircraft recognition through use of models.

**Elements of Practical Sheet Metal Work.** Graham. New York: Sheet Metal Publication Co., 45 West 45th Street. Pp. 60. Paper covered. $1.00.

Thirteen lessons compiled for use with defense classes. Covers use of tools for drawing patterns, soldering and riveting, making seams, edges, joints and corners, forming Pittsburgh locks, mensuration, and data on various metal sheets. List of helpful books given.

## *PAMPHLETS:*

**Dictionary of Radio Terms.** Edited by L. O. Gorder. Chicago: Allied Radio Corp., 1943. Pp. 34. $.10. Concise definitions of commonly used words in radio, electronics, and television. RMA color code for resistors. Chart and explanation of how to read schematic diagrams. List of useful radio books.

**Welders' Vest Pocket Guide,** prepared by Hobart Brothers for free distribution, explains welding symbols and the essentials of proper welding procedure, faulty welds and their correction. Trouble check chart on welding machine troubles. Illustrations of all types of joints. "How-to-find" list and handy reference information on decimal equivalents. Write for EW-95 to Hobart Brothers Co., Troy, Ohio.

**Technical Books for Schools.** Bloomington: McKnight & McKnight. Pp. 31. Descriptions of all the technical books published by this company for schools. List of authors. Index.

**Wiley Books, 1943-1944.** New York: John Wiley & Sons, Inc. Pp. 249. A complete list of the technical and scientific books published by this company during 1943-1944. Subject and author and title indexes. List of subjects covered and new books in press.

## *VISUAL AIDS:*

**What Is Electricity?** A new sound motion picture presenting the basic theory and principles of electricity clearly and effectively through animated drawing and word description, is available to schools without cost on both 16mm and 35mm film. Can be purchased for a permanent library for a small amount. Write School Service, Westinghouse Electric & Mfg. Co., 306 Fourth Ave., P. O. Box 1017, Pittsburgh 30, Pa.

**Lightning** is a new G-E 16mm silent motion picture explaining important scientific facts about both natural and laboratory lightning, theory and practice of protection, and research work in the field and the laboratory. Write for publication GEA-4056 for more information on the film and for GES-402 to find out how to order any G-E film. General Electric Co., Schenectady, N.Y.

**National Directory of Safety Films,** containing reviews of nearly 400 films on safety, tells where and how they may be obtained. Mostly 16mm sound motion pictures with some 35mm types. Special section on slidefilms, both silent and disk-type sound films. Classified list of 88 agencies and firms who loan, sell, or rent them. Available at cost of 15c from *Business Screen*, 157 East Erie, Chicago 11, Ill.

**Turret Lathes.** Warner & Swasey has available several wall charts on turret lathes, both "A" and Ram types. Also a useful pictorial cutter grinding chart and various booklets. Write Operators' Service Bureau, Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

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**Alfred A. Ghirardi,** well known author of books on radio theory, maintenance, and repair, announces the sale of his Radio and Technical Publishing Co. to Farrar & Rinehart, Inc. All "Ghirardi" radio books may now be bought from the Radio & Technical Division of Murray Hill Books, Inc. (subsidiary of Farrar & Rinehart), 232 Madison Avenue, New York 16, N.Y.

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# *news*

**WHAT'S DOING IN THE FIELD OF INDUSTRIAL EDUCATION**

ARRANGEMENTS are nearing completion for the Chicago Wartime Vocational Training Conference of the American Vocational Association to be held December 15 to 17. State directors and other groups will begin their sessions on December 13 and exhibits will open on December 14 at the Palmer House. Convention sessions will be held at the Palmer House and at the Morrison Hotel. An excellent program has been outlined with emphasis on war and postwar developments in the vocational and industrial arts fields.

THE Educational Research Committee of the Model Industry Association held a meeting in New York October 17 and 18 at which specific plans were laid which will result in the various manufacturers receiving concrete suggestions as to how to elevate the educational value of their products, according to William Bibishkow who has supplied SCHOOL SHOP with information concerning the activities of this forward-looking organization. Captain Kendall Hoyt of headquarters of the Civil Air Patrol spoke to the meeting outlining the plans of the Junior C.A.P. In order to help reduce the number of washouts of crew members, the C.A.P. has been entrusted with the task of giving pre-induction training to boys signing up with the organization. Actions of the Educational Research Committee will take full cognizance of the needs of the Junior C.A.P. as well as established school channels.

TEACHERS responsible for preinduction programs will be interested in the following list of Army officers who are representatives for each of the service commands of Civilian Preinduction Training. These officers can supply authoritative information on the program and they have already established relationships with the state departments of education in their areas. All of them have a background of school experience which enables them to be of special help to schools carrying on preinduction work. The number of the service command precedes each of the listings:

I. Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island.—*Captain Frederick A. Zehrer, 808 Commonwealth Ave., Boston, Mass.* (Formerly Director of Child Guidance, Greenwich, Conn., Schools.)

II. New York, New Jersey, Delaware. —*Major Charles F. Dienst, Room 702, 50 Broadway, New York City.* (Formerly Deputy State Superintendent of Public Instruction, Nebraska.)

III. Pennsylvania, Maryland, Virginia.—*Captain Harry L. Dotson, 711 Keyser Bldg., Redwood & Calvert Sts., Baltimore, Md.* (Formerly Superintendent of Schools, Delta, Colo.)

IV. Alabama, Georgia, Mississippi, Florida, North Carolina, South Carolina, Tennessee.—*Major Isaac N. Carr, 302 Walton Bldg., Atlanta, Ga.* (Formerly Dean of Administration, Mars Hill College.)

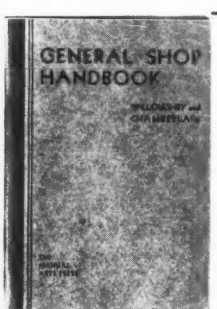
V. Ohio, West Virginia, Indiana, Kentucky.—*Captain George L. Fahey, 631 Huntington Bank Building, Columbus 15, Ohio.* (Formerly Instructor, Education and Psychology, University of Pittsburgh.)

VI. Illinois, Michigan, Wisconsin.—*Major Arthur K. Vincent, 1828 Civic Opera Bldg., 20 N. Wacker Dr., Chicago, Ill.*—(Formerly Superintendent of Schools, Walworth, Wis.)

VII. Iowa, Missouri, Kansas, Nebraska, North Dakota, South Dakota, Minnesota, Colorado, Wyoming.—*1st Lt. John R. Rackley, 412 Omaha Loan Bldg., 15th & Dodge Sts., Omaha, Neb.* (Formerly Assistant Professor of Social Science, Teachers College of Connecticut.)

VIII. Arkansas, Louisiana, Oklahoma, Texas, New Mexico.—*Lt. Colonel Jay Dykhouse, 908 Santa Fe Bldg., Dallas, Texas.* (Formerly Superintendent of Schools, Charlotte, Mich.)

IX. Arizona, Idaho, Utah, Nevada, Montana, California, Oregon, Washington.—*Captain Elmer E. Wilson, 450 Mission St., San Francisco 5, Calif.* (Formerly Superintendent of Schools, Mullen, Idaho.)

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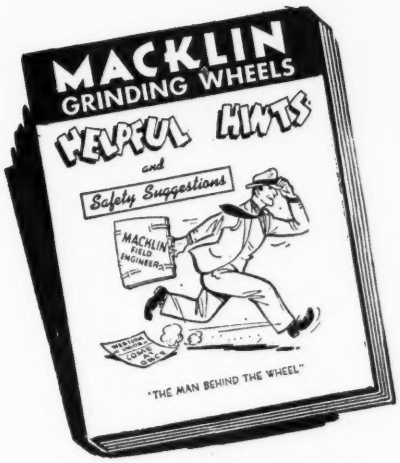


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# Harmful Methods in Teaching Drawing

BY *Benjamin J. Stern*

**Not all drawing teachers will agree with the viewpoint of the author but his expression of opinion may help to stimulate thought on the subject. Other articles on this subject will be welcomed by the editor. Mr. Stern teaches at the Machine and Metal Trades High School, New York City.**

DRAWING teachers, like other instructors, are often prone to get into certain ruts in their teaching. Some of them are apt to accept, without much critical thought, certain methods which I believe are really harmful as they establish bad work habits in students. Here, in my opinion, are three such methods:

1. The student is sometimes taught to divide his drawing sheet into four equal parts as shown in Figure A. While this device may work for the simplest of beginning plates, as soon as the drawings become larger and more complex the students become confused. They frequently find that it is impossible to get the views into the restricted portions of the boxes.

The student should be taught as a beginner that by a little simple arithmetic he can lay out his work clearly and symmetrically and that there is no need to restrict himself. Thus an unnecessary habit can be avoided at the start.

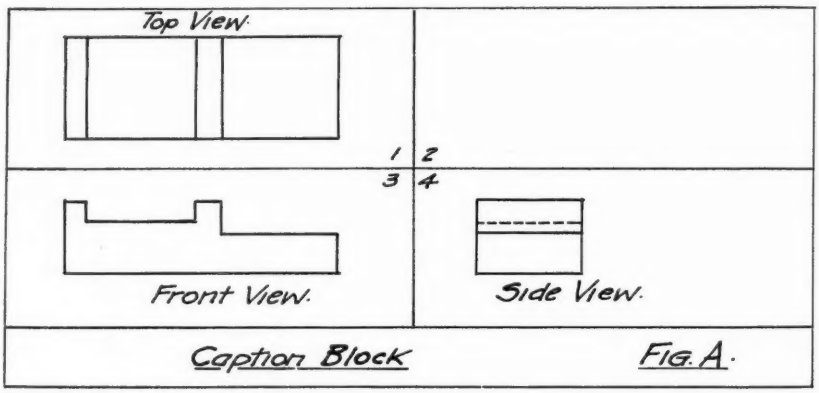
2. In delineating the side view of an object, a favorite method is to transfer the top view by means of 45° lines or by the use of arcs as in Figure B. Again while this serves very well in simple drawings, confusion arises as soon as the task becomes more complicated. The pupil, charmed by the simplicity of the method, keeps on adding more and more lines until his drawing is almost impossible to read. Worse than this, however, is the fact that the beginner who uses this idea does not learn sufficiently well the relationship between the top and side views. Thus when he is unable to use the transfer method because of complexity, he is baffled.

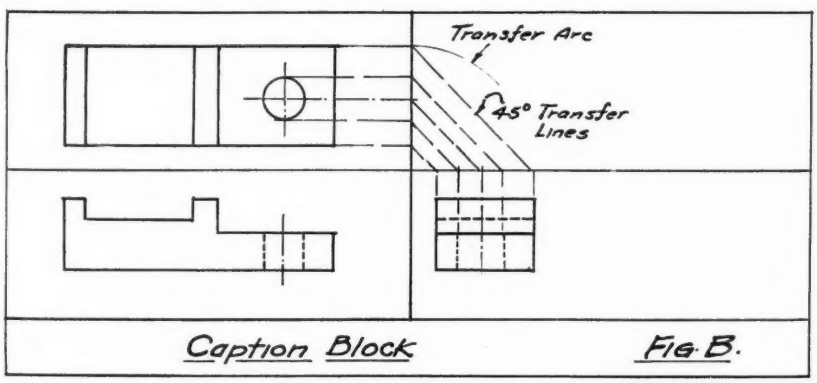
In my opinion, the use of 45° lines or arcs should be avoided entirely to arrive at the side view. From the beginning, my students transfer dimensions from the top to the side view by means of dividers. This method has the advantage of eliminating unnecessary lines and the students have impressed on them at once the definite connections between the two views. When the student has grasped this idea and made it a habit, it is then safe to demonstrate to him the transfer method as part of his related information and with its limitations well understood.

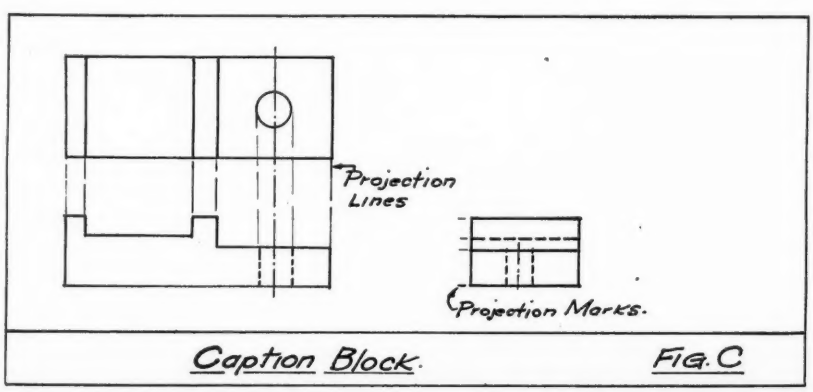
3. Beginners are often taught to transfer or project points from one view to another by means of light projection lines as in Figure C. While there is no objection to this procedure at the beginning of instruction, the learner, unfortunately, carries this habit over to the more difficult drawings. The result is that often the drawing is a mass of lines among which it is difficult to determine the views and dimensions.

From the beginning I instruct my students to project points from view to view without making any lines except for a short dash at the proper point. Thus view connections are determined with the drawing kept free of unnecessary lines.

It cannot be emphasized too strongly that the time to inculcate good drawing habits is at the beginning of the students' instruction. The three points I have stressed in this article are basic in this connection.

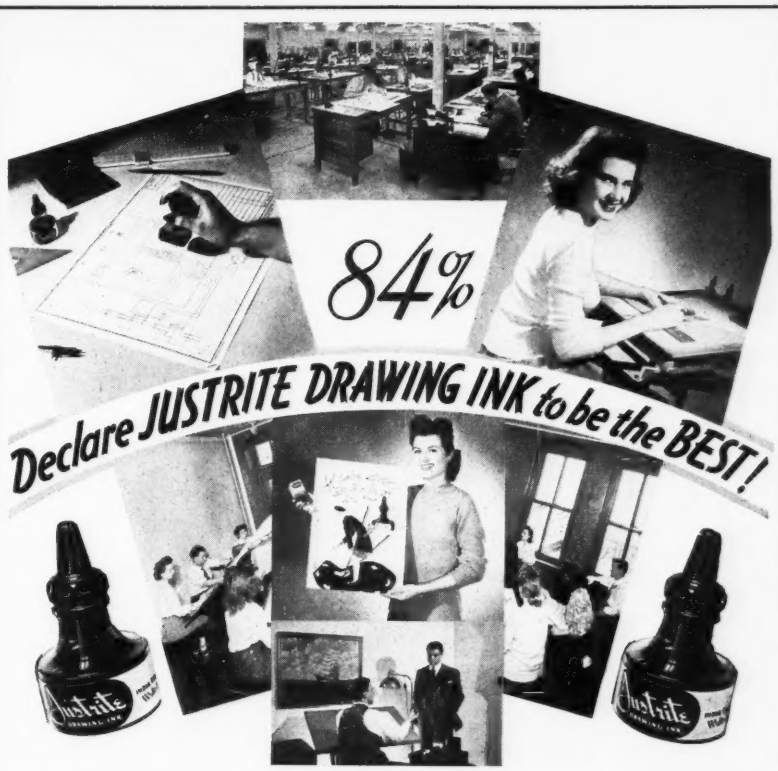


## *Strictly Personal...*
### ABOUT YOUR FELLOW TEACHERS

WILLIAM E. WARNER, professor of education, Ohio State University, has been commissioned a major in AMG and expects to be sent overseas, following a training period. . . . CLARENCE H. DYE, printing instructor at O'Keefe Junior High School, Atlanta, Ga., is now on the staff of the Glendale, California, Union Academy. . . . HENRY BEUKEMA is a new member of the industrial arts faculty at Western Michigan College of Education, Kalamazoo. . . . FRANK HUFFAKER, former teacher, has been appointed director of vocational education for Chattanooga, Tenn., succeeding the late OTIS C. KIRKMAN, pioneer industrial education leader in the state. . . . MARY K. RIEFF of the Cushing, Okla., schools has been named instructor in printing at the Turner, Kansas, schools this year. . . . DONALD BROSSMAN and GEORGE DECKER of the Buffalo, N.Y., State Teachers College faculty have joined the armed forces. . . . MARVIN R. BELL, formerly of Bainbridge, Ind., has been appointed to teach industrial arts at Indiana State Teachers College, Terre Haute. . . . J. ELWORTH BLACK of Nashville, Tenn., has joined the staff of the Tennessee State Department of Vocational Education as assistant state supervisor of VTWPW. . . . HARRY J. PATTERSON of the Newton, Mass., Trade School and part-time teacher-trainer for the Massachusetts State Department of Vocational Education has been named teacher-trainer for the state of Vermont with headquarters at the University of Vermont, Burlington. . . . RALPH I. ROGERS of East Chicago, Ind., has joined the faculty of Indiana State Teachers College where he will teach machine-shop work with emphasis on experimental work in the related subjects field. . . . RAY CRAIL, supervisor of day-trade programs at High School East, Wichita, Kansas, has been named coordinator of training programs of the various federal agencies assisting in the training of workers for industry with the War Manpower Commission. . . . WILLIAM OAKES of Tennessee Polytechnic Institute, Cookeville, has rejoined the faculty of Stair Vocational High School, Knoxville, Tenn. . . . DAVID S. MARSTON has resigned as supervisor of the VTWPW program at Stair Vocational High School, Knoxville, to become director of education for the Rohm-Haas Co., Knoxville.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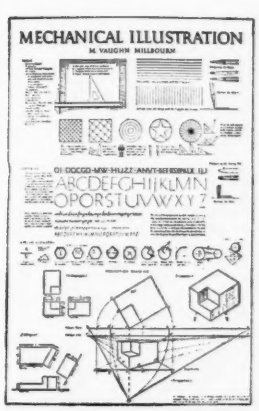


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Write Sailplane Corporation of America, 9242 Beverly Blvd., Beverly Hills, Calif., *or check number 33 below.*

## HANDBOOK OF PRINT-MAKING RECENTLY PUBLISHED

Paragon-Revolute Corp., Rochester, has just issued a new "Handbook of Print-Making and Processing" covering the use of blueprints, direct-process prints, sepia prints, and reproduced tracings, listing the advantages of each.

Mr. H. H. Sullivan, president of the company, has attempted to boil down in fewest possible words a description of the various processes, describing the uses to which each type is most adaptable. The text is extensively illustrated.

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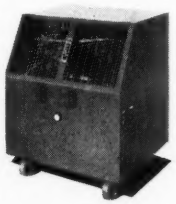

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**Woodworkers' Supplies.** Rare woods and veneers, scroll-saw patterns, mouldings, turned and carved legs, tools, and hard-to-find hardware are described in Hunt's 1943 catalog No. 14, put out by the Craftsman Wood Service Company, 2727 S. Mary St., Chicago, Ill., *or check number 36 below.*

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**Slidefilms for PIT Courses.** A list of the new "Slidefilms for Preinduction Training" produced by the Society for Visual Education, Inc., has just been announced. Films on preflight, radio, machines, and automotive mechanics are included. Write Society for Visual Education, Inc., 100 East Ohio St., Chicago 11, Ill., *or check number 38 below.*

**Reference Catalog.** Atlas Quick Reference Catalog. Condensed information on machine tools, including motor specifications. Atlas Press Co., Kalamazoo, Mich., *or check number 39 below.*

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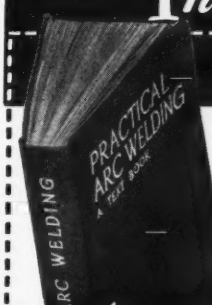


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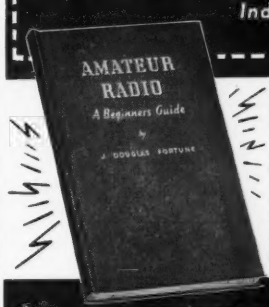


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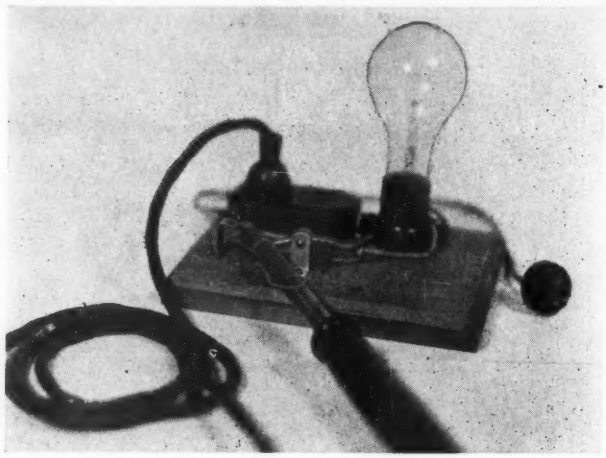


# Prolonging the Life of a Soldering Iron

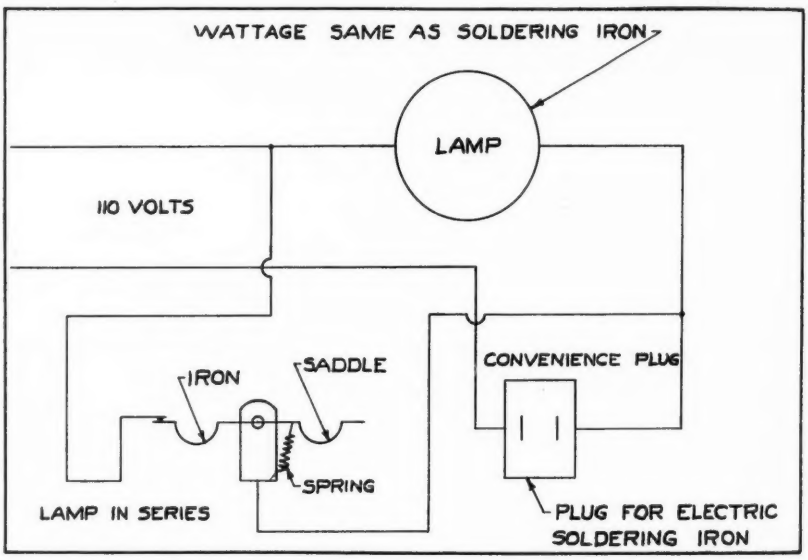
BY *Gerald F. Lanks*

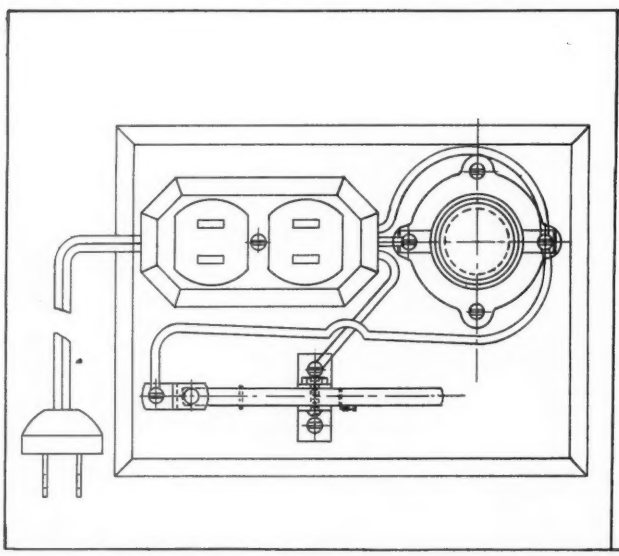
**This saver of soldering irons can be easily made by students from salvage found around the school shop. It is particularly useful in the electrical or radio shop where soldering irons are in constant use so that their elements burn out relatively quickly. Care must be taken with this project to warn students of the exposed "hot" parts of the device. An alternative for the lamp might be to use a resistor of the proper wattage. G. F. Lanks teaches radio at McKeesport, Pennsylvania, Vocational School.**

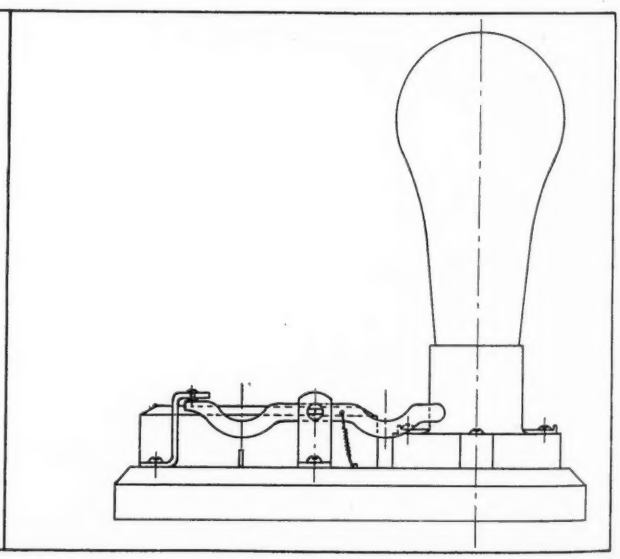
TESTED INSTRUCTIONAL PROJECT

IN THESE days of "hard-to-get" tools for radio repair it is most advisable to take good care of what you have. Here is a soldering-iron saver which can be built in the shop with parts usually found around a shop.

The accompanying drawings show that the iron placed in the left saddle will put the lamp in series with the iron. Both being of equal wattage, the iron will get quite warm but can be left in this saddle for any length of time without damage to the iron. On removing the iron from the left saddle to use in soldering or placing in the right saddle it will very quickly heat to full heat. This not only saves the life of the iron but also saves time in waiting for a cold iron to heat up.





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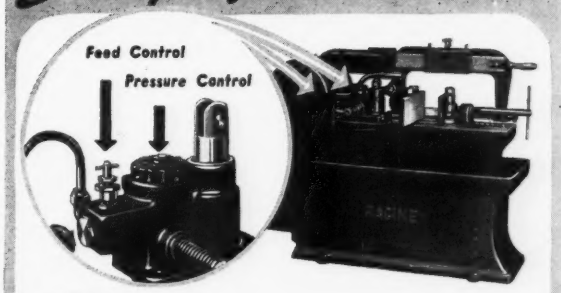


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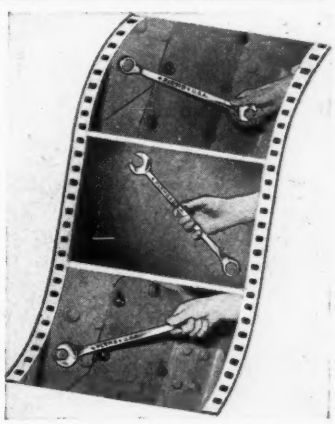

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# *from* WASHINGTON by MICHAEL PACA

TWO men dominate the vocational education picture this month. They are Senator Elbert Thomas of Utah, and Brig. Gen. Frederick H. Osborn.

And without disrespect to the General, the orchid for sheer labor in the interest of education goes to the Senator.

For the past 10 years, Senator Thomas has been working on a bill to bring federal aid to education. Finally, he succeeded in bringing the measure to the Senate floor for debate. It called for only $300,000,000 to help raise teachers' salaries. However, in one of the most tragic and tricky episodes seen from the Senate gallery for a long time, the aid-to-education bill was defeated.

But seven days later came a message from the President asking for a billion dollar program for education of veterans, as worked out by Brig. Gen. Osborn and his committee. Not at all dejected by his recent defeat, Senator Thomas introduced S. 1509 designed to carry out recommendations of the Osborn report. "I start on this with enthusiasm," said Senator Thomas. This bill, toned down somewhat, will probably pass.

● First, a word more about the defeat of Senator Thomas' bill on federal aid and then we shall move on to General Osborn's proposals.

Vocational education was "Exhibit A" throughout the debates on the bill. It was cited by friends of the bill to show that the federal government can aid education without trying to control it.

Said Senator Thomas: "For nearly 20 years all the states have carried on vocational education through the schools. Never once has the vocational education policy been criticized because the federal government has been trying to dominate such education and no federal official would ever go into a city where such systems are in operation and try to control them."

And worthy Senator George of Georgia arose and said: "My name happens to be attached to three of four measures having to do with vocational education in the United States . . . I do not believe that anyone can truthfully say that through the contribution made by the federal government to vocational education the Government has controlled or has undertaken to control the policies of the schools."

Nevertheless, a few Senators continued to object that if passed, the measure would inject the federal government into every schoolhouse. No Senator wanted to see that happen. Suddenly, after eight days of debate, came an amendment wrapped in a mantle of nobility. It stated that the federal funds appropriated by the bill *and the state funds supplemented* thereby must be spent without discriminating against any person because of race, color, or creed.

Southern Senators could not accept this provision. But neither could those who honestly did not want federal interference in schools. Result: the bill was sent back to committee—in other words, pigeonholed for months to come.

● Senator Thomas' enthusiasm in introducing a bill containing the proposals of the Osborn Committee is easy to understand. If enacted into law, one billion dollars of federal funds would be poured into education's coffers. Some 12,000,000 to 13,000,000 men and women, formerly in the armed forces and merchant marine, would become potential customers for schooling and training. Education would enjoy a boom such as it has never experienced before. For the Osborn proposals would make it possible for most men and women with six months or more military or merchant-marine service to go to any school or college for one year, all expenses paid. A smaller, more qualified group would be paid to carry on their education for one, two, or three more years.

But there was no doubt in Gen. Osborn's mind that most veterans would flock to vocational education courses. He wrote to the President: "If for no other reason than the urgency which most exservice people will feel to get jobs and get established after the war, we anticipate that their educational inclinations will run strongly in favor of what is commonly characterized as practical training." In fact, he is almost afraid of that fact—afraid that the rush of veterans to school shops will deprive the nation of a "leaven" of people schooled in civic and liberal education. Gen. Osborn therefore appointed a group to broaden and to adjust vocational courses "which are certain to attract exservice people in large numbers."

By way of explanation Gen. Osborn adds: "In suggesting such steps the committee has no intention of depreciating the importance of continued vocational and professional education which must be both extended and accelerated after the war to meet educational deficiencies caused by the war."

● One thing is clear from the report: no ghost of NYA or CCC will be permitted to walk again. Gen. Osborn specifically says that traditional state and local control of education must be fully respected. If Gen. Osborn and Senator Thomas have their way, the federal government itself will not go into the business of educating exservicemen.

Strangely, neither Senator Thomas' bill incorporating the Osborn proposals nor the report itself mentions the U. S. Office of Education by name. The report merely recommends creation within a permanent federal agency of an office to assist state authorities in developing the program for our veterans. It appears from talk going around Capitol Hill that the program will be set up strictly on state and local lines.

● Incidentally, the veterans vocational education program, if it is approved by

*(Continued on page 21)*

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Sit down for a minute and think things over. Why are most people making more money today? It's because of the SAME cussed war that's killing and maiming some of the finest young folks this country ever produced.

So if anyone uses his extra money to buy things he's in no particular need of . . . if he bids against his neighbor for stuff that's hard to get and pushes prices up . . . well, sir, he's a WAR PROFITEER. That's an ugly name—but there's just no other name for it.

Now, if I know Americans, we're not going to do that kind of thing, once we've got our FACTS straight.

All right, then. Here are the seven rules we've got to follow as GOSPEL from now until this war is over. Not some of them—ALL of them. Not some of us—ALL OF US, farmers, businessmen, laborers, white-collar workers!

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**Keep your OWN prices DOWN.** Don't ask higher prices—for your own labor, your own services, or goods you sell. Resist all pressure to force YOUR prices up!

**Never pay a penny more** than the ceiling price for ANYTHING. Don't buy rationed goods without giving up the right amount of coupons.

**Pay your taxes willingly,** no matter how stiff they get. This war's got to be paid for and *taxes are the cheapest way to do it.*

**Pay off your old debts.** Don't make any new ones.

**Start a savings account** and make regular deposits. Buy and keep up life insurance.

**Buy War Bonds** and hold on to them. Buy them with dimes and dollars it HURTS like blazes to do without.

Start making these sacrifices now—keep them up for the duration—and this country of ours will be sitting pretty after the war . . . *and so will you.*

*Uncle Sam*

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**Use it up • Wear it out**
**Make it do • Or do without**

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